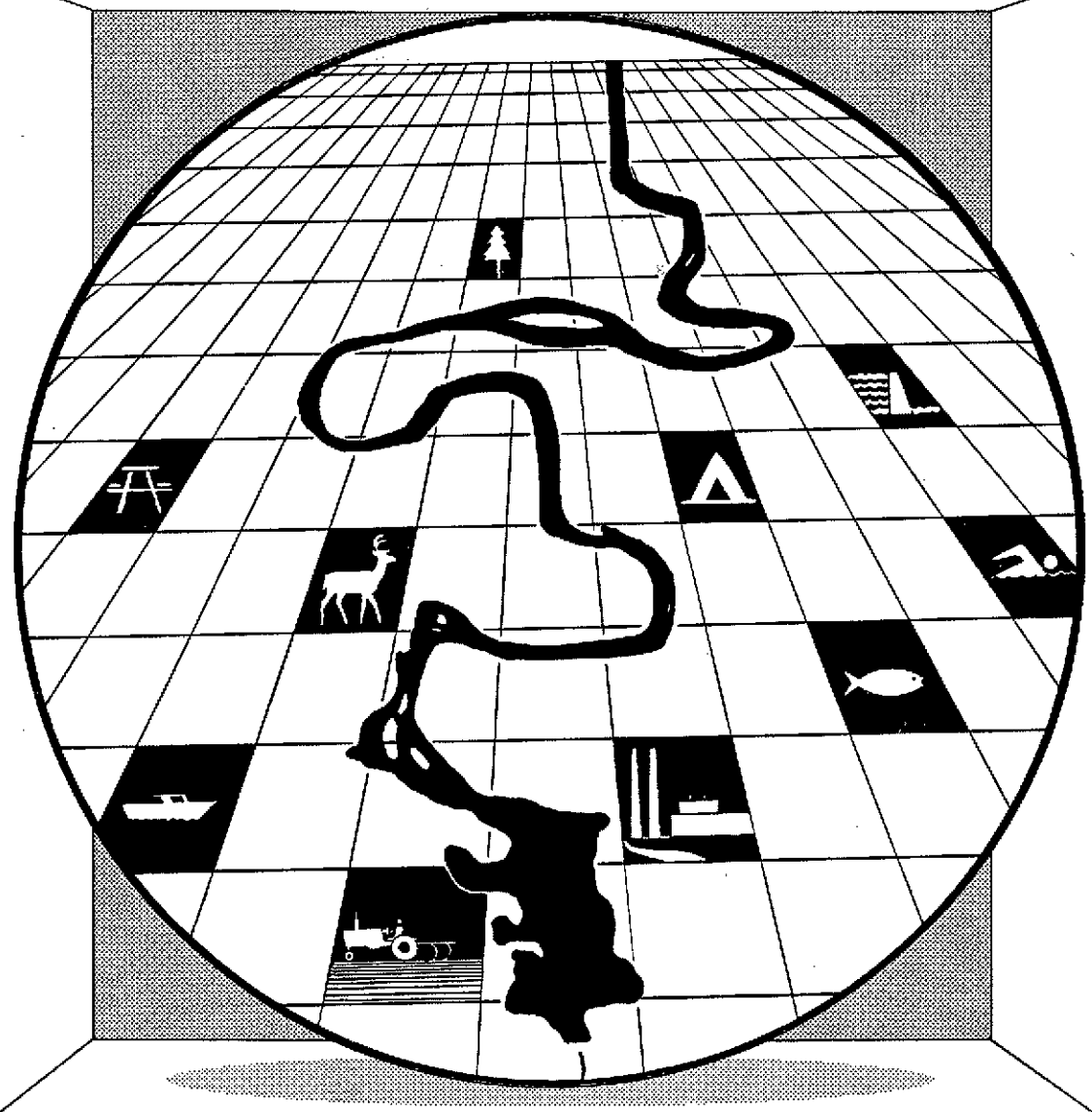

NICKAJACK RESERVOIR LAND MANAGEMENT PLAN

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Prepared By

Tennessee Valley Authority
Resource Development Group
Reservoir Lands Planning

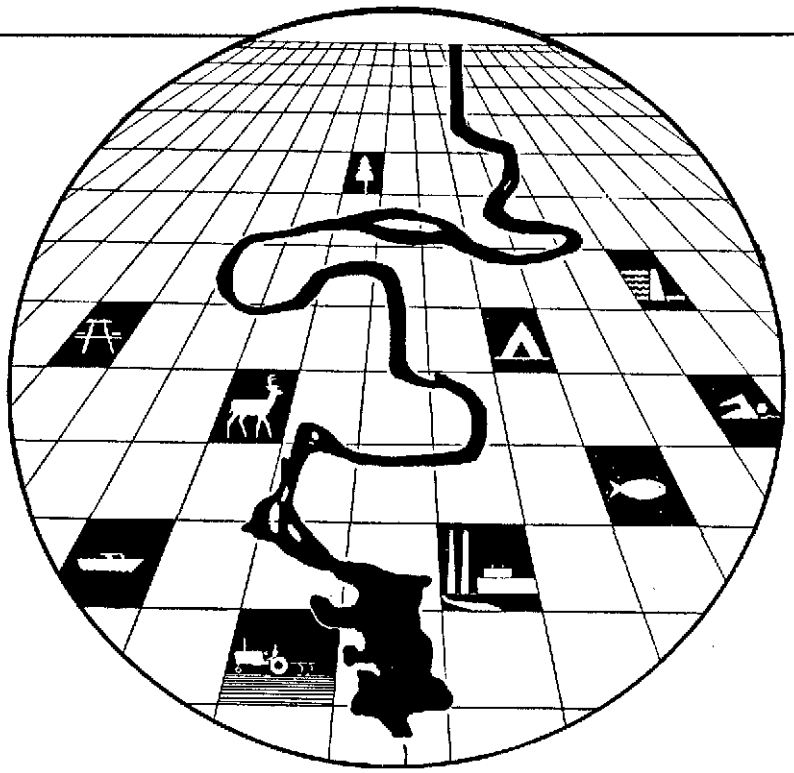
January 1990

CONTENTS

CONTENTS
(Continued)

NICKAJACK RESERVOIR PLAN

Introduction



INTRODUCTION

Throughout its history, the Tennessee Valley Authority (TVA) has managed the public reservoir lands under its stewardship to meet a wide range of regional and local resource development needs and to improve the quality of life, both within specific reservoir areas and throughout the Tennessee Valley. Reservoir properties, together with adjoining private lands, have been used for public parks, industries, and wildlife management areas and to meet a variety of other needs of local communities.

An increasing demand for and use of reservoir land sometimes results in conflicting and uneconomical land use patterns and friction between public and private use. These competing interests and development pressures, coupled with today's environmental awareness, underscore the necessity for a planned approach to the management of TVA's reservoir land and related resources. Consistent with TVA Code V, LAND USE, USE OF REAL PROPERTY, TVA uses the Reservoir Lands Planning process as the mechanism for evaluating and determining the most suitable use of TVA land.

The Reservoir Lands Planning process is based on active participation by TVA program staffs, other government agencies, nongovernment organizations, and the general public. Comments from these groups are used to identify regional and local land management needs and to develop reservoir-specific objectives for realizing TVA's valleywide reservoir land management goals, which include:

1. Promoting economic development;

2. Protecting the amenities and environmental quality of reservoirs and adjoining lands;

3. Providing a diversity of quality recreation opportunities on TVA reservoirs and adjoining land;

4. Protecting and enhancing the forestry, fisheries, and wildlife resources, as well as preserving the cultural and agricultural resources, around the reservoir area for future generations.

Specific objectives, or steps for realizing these goals, are developed from the advice and technical expertise of TVA staff, combined with public input about local values and priorities related to reservoir land use. Because the public's interests and the available resource base are different on each reservoir, the management objectives must be tailored to fit the specific reservoir. The PLANNING ISSUES AND OBJECTIVES section of this plan contains a detailed discussion of these objectives for Nickajack Reservoir.

The 46-mile-long Nickajack Reservoir, impounded in 1967, flows east to west through two counties in south central Tennessee: Hamilton and Marion. It is the most recent of nine mainstream reservoirs constructed on the Tennessee River. The reservoir extends from Chickamauga Dam to Nickajack Dam, creating 192 miles of shoreline at normal summer pool

level. The reservoir fluctuates only 2 feet annually, providing a relatively stable year-round water level. Towns closest to the reservoir include Jasper and South Pittsburg, Tennessee, located in Marion County. The nearest large city is Chattanooga, in Hamilton County, located at the most eastern point of the reservoir.

This plan will guide TVA resource management and property administration decisions on 3,171 acres of land under TVA custody and control on Nickajack Reservoir. Although the reservoir flows through both Hamilton and Marion Counties, all of TVA's landholdings are in Marion County. The plan identifies the most suitable use(s) for the land and provides sites for a variety of economic development, recreation development, and resource management purposes. The planned acreage is TVA fee-owned land and accounts for 30 miles (16 percent) of the total 192 miles of reservoir shoreline. The remainder of the shoreline not addressed in the plan falls into two categories:

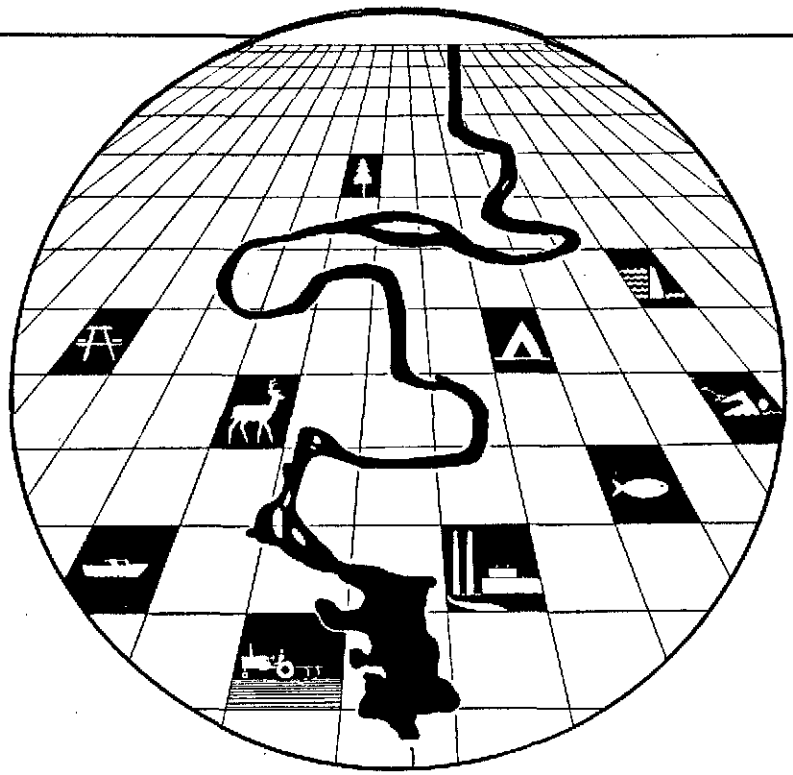
1. 2 miles (1 percent) - Shoreline fronting TVA land that has been sold or transferred for commercial, industrial, or public recreation purposes, or that has been transferred to other government agencies for uses other than public recreation.

2. 160 miles (83 percent) - Shoreline fronting privately owned land which was not purchased by TVA, or shoreline fronting privately owned land over which TVA purchased flowage easement rights only.

Further details and documentation of the Nickajack Reservoir land management planning effort are contained in two appendices to this plan. Appendix A documents the public's involvement in development of the plan. Appendix B contains information about the data collected for this planning process. Both appendices are available on request.

NICKAJACK RESERVOIR PLAN

Planning Process



PLANNING PROCESS

A multidisciplinary TVA team undertook a detailed planning process that resulted in the land use designations presented in this plan. Both public input (Appendix A) and information from TVA specialists (Appendix B) were carefully analyzed.

TVA specialists provided information used to develop an extensive computerized data base about physical resource characteristics of the land, existing uses of TVA land and adjoining property, economic conditions in the two-county reservoir area, and environmental constraints. Data such as population, economic, and historical information were gathered from the two counties through which the reservoir flows. More detailed parts of the data base--such site-specific data as recreation facilities and wildlife resources--were gathered from a study area that extended about one-half mile from TVA's property line. Appendix B contains a description of the data base.

In addition to the resource data, local residents and users of the reservoir are important in determining suitable uses for TVA's reservoir land. During the first week of September 1987, TVA staff met with Nickajack Reservoir area groups--civic clubs, government officials, and business associations--to provide information about the planning process and to encourage public involvement. Contacts were also made with the media in the reservoir area.

Subsequently, 125 people attended two public workshops held in Chattanooga and Jasper, Tennessee, also in September 1987. The participants provided information about (1) what they valued about the reservoir, (2) what improvements and changes in the management of TVA land around the reservoir would increase its value to them, and (3) what they foresaw as the major problems or issues regarding management of the reservoir over the next 10 years. The comments from both workshops, as well as all written and telephone correspondence regarding Nickajack Reservoir land use, were compiled and sent to approximately 1,100 individuals, agencies, and organizations, including all workshop participants, for confirmation and further comment in November 1987.

The planning team attended the public workshops and used the public comments, along with technical advice from TVA staff, to develop the management objectives described in the PLANNING ISSUES AND OBJECTIVES section of this plan. These objectives guided the team's analysis of all available information and their subsequent identification of appropriate land uses.

TVA specialists provided the team with capability ratings of excellent, good, fair, or poor for all possible uses on each tract of TVA land. The ratings were based on an analysis of specific criteria that indicate whether a tract is physically capable of supporting a given use. Capability criteria include various engineering and physical site characteristics of the land, such as slope, soil productivity, erosion hazard, and access to navigable water. Appendix B contains a description of the specific criteria and capability ratings for each proposed use.

TVA staff also provided the planning team with proposed uses for the TVA land based on the capability ratings and other suitability factors such as previous investments, interest by other

agencies and organizations, TVA program objectives, and local or regional needs. The team compared maps of all the proposed uses with such mapped resource data such as wetlands, floodplain locations, threatened or endangered species, and prime farmland to identify possible constraints or conflicts with proposed uses. The team then analyzed the suitability of potential uses by reviewing additional information: the economic conditions of the reservoir area, the reservoir management objectives, public comment, and TVA land management goals and policies. Through discussion, the most suitable use or uses for each tract of TVA land were identified.

After designating each tract of land for one or more compatible use(s), the team reviewed the plan in terms of how it met the reservoir management goals and planning objectives. In areas where the team felt the objectives had not been met, adjustments were made to the plan.

The plan was then reviewed within TVA, and various organizations within TVA provided the team with comments on and suggested revisions to the plan. The team resolved the conflicting concerns raised by this internal review, and the initial draft was revised and reprinted. The revised draft plan was mailed to over 800 individuals, agencies, and organizations, in March 1988, for their review and comment.

Fifty-five people attended two public review meetings held in Chattanooga and Jasper, Tennessee, in April 1988 to receive comments on the draft plan. In addition, more than 1,000 individuals either wrote letters or telephoned TVA's Citizen Action Line regarding the plan.

The major issue identified through the public review process concerned the designation of TVA's Little Cedar Mountain (LCM) property for commercial and/or public recreation development. Many valid points were raised both for recreation development and for nondevelopmental wildlife management and related uses of this land. After carefully considering all of the public comments, the team determined that additional unbiased information, including a recreation development feasibility study prepared by an outside consultant, was required to reach consensus on the designation of LCM.

In September 1988 TVA selected Economics Research Associates, a national land use economics consulting firm specializing in recreation development, to provide the following information:

- Recreation Needs Analysis - To determine the demand for at least two levels of recreation facility development;

- Development Concepts - To identify ranges of facilities, acreage requirements, environmental impacts, and direct and indirect costs for each level of development;

- Feasibility and Market Analysis - To determine the economic feasibility of, and to identify, marketing and implementation strategies and developer/operator options for each level of development; and

- Economic Impact Analysis - To provide an assessment of benefits and an assessment of costs to the local area, State, and region which would result from each level of development.

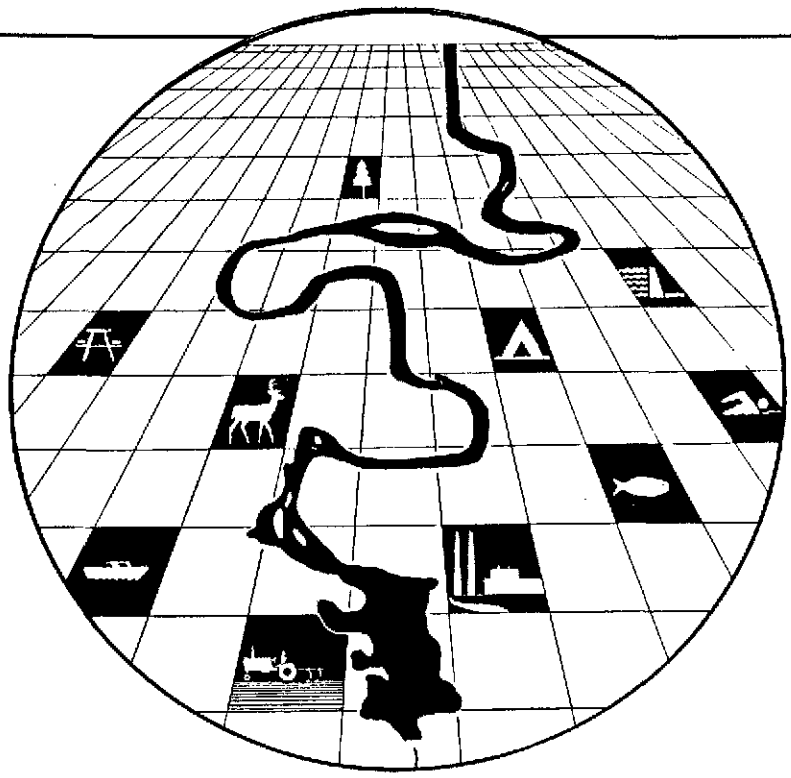
Concurrent with the selection of an appropriate consultant, the team compiled and prepared responses to the public comments. This "Summary of Public Comments and TVA Staff Responses" was mailed in October 1988 to all those who provided comments on the draft plan. With the exception of the LCM issue, the planning team's responses provided recommended revisions to the plan based on the public input, review of the data base, and consideration of the reservoir management goals and objectives.

In April 1989 the feasibility study was completed. It found that private sector commercial recreation development at LCM was not financially feasible and recommended that public sector development be pursued. Based on the study's findings, the planning team recommended that the LCM property be allocated for public recreation development only. A public meeting was held in August 1989 at Jasper, Tennessee, to present the findings of the study and recommendations for final revisions to the draft plan. Nine persons attended the meeting.

The TVA Board of Directors approved the final Nickajack Reservoir Land Management Plan on January 23, 1990.

NICKAJACK RESERVOIR PLAN

Reservoir Description



RESERVOIR DESCRIPTION

The following description of the reservoir area was drawn from the planning data base and reflects the existing condition of the reservoir area as of October 1987, unless otherwise indicated.

HISTORICAL OVERVIEW

Nickajack Reservoir occupies a 46-mile section of the Tennessee River that stretches from the city of Chattanooga, Tennessee, to the mouth of the Sequatchie Valley. Archaeological studies indicate that man has occupied this area for several thousand years, culminating with the historic Creek and Cherokee Indians. Hernando de Soto and his expedition were most likely the first white men to see this land as they came through the area in the summer of 1540 on their way to the Mississippi River. Native Americans remained the primary inhabitants of the reservoir area until white settlers began to encroach upon the new frontier in the early 1800s. In fact, the Cherokee were so entrenched in the region that the Tennessee River was commonly referred to as the "River of the Cherokees."

The Cherokee had all claims to the land in the reservoir area; however, white immigration was encouraged by both the Federal and State governments. While early treaties enabled whites to inhabit some parts of the Sequatchie Valley, it was the Jackson and McMinn Treaty of 1817 that opened up settlement of Marion County by deeding land from the Cherokee to the United States Government. From this land the State of Tennessee created Marion County on November 20, 1817.

In 1824 there were 384 recorded land claims by white settlers; by 1842 there were more than 2,000. As Indian resistance to the white settlers deteriorated, the U.S. Senate ratified the Treaty of New Echota (1836). In 1838 removal began, a "Trail of Tears," which displaced approximately 2,500 Cherokees from the lower valley of east Tennessee.

Even as General Winfield Scott was executing the Treaty of New Echota by collecting, removing, and marching some 12,000 Cherokees to Oklahoma, whites were rapidly moving into the area. Ross's Landing quickly became Chattanooga in 1838, a trading center which had been described by an English traveler two years earlier as "a small village hastily built, without any regard to order or streets." Hamilton County's white population increased from 821 in 1820 to 2,276 by 1830 and to 8,175 by 1840. By the mid-1840s, the eastern end of the Nickajack Reservoir area had approximately 10,000 residents.

The economy of the region was focused almost totally toward the Tennessee River. The good bottom land and easy access to the river were attractive to many. Marion County developed mainly as an agrarian, rural area with the pioneer families demonstrating self-sufficiency. Corn was the major crop, while hogs and cattle were often the main source of cash income. Tanning yards sprang up, as did grist mills. One of the oldest mills in the area is the Ketner Mill, built in 1824, which served as a focal point in the early settlement of the Sequatchie Valley.

While the western portion of the reservoir area remained rural, Chattanooga at the eastern end became quite urban in the period before the Civil War. In addition to its orientation to the river as a landing point, Chattanooga also became a rail transportation center. By the time the Civil War began, four major rail lines ran through Chattanooga: the East Tennessee and Georgia, the Western and Atlantic, the Nashville and Chattanooga, and the Memphis and Charleston. Chattanooga emerged as a major rail junction and by 1851 was incorporated.

While the benefits of the railroads were numerous, the river was still an important transportation system in the decades before the Civil War. The increase of steamboat traffic brought new people to the area; however, it was still treacherous to travel the river as this description indicates:

> It cuts a deep gorge between Raccoon Mountain and the southern end of Walden Ridge about 1,000 feet below their summits. For a distance of about 20 miles, early rivermen knew this section as the Narrows, now called the Grand Canyon of the Tennessee.
>
> Here the river is contracted into a narrow channel bordered by rocky defiles. Fanciful names such as the Tumbling Shoals, the Suck, the Boiling Pot, and the Frying Pan (or the Skillet), were given to the more treacherous places.*

By 1827, there was national interest in improving the Tennessee river for navigation purposes. Secretary of War John C. Calhoun stated that improvement of the Tennessee River was of national concern. Congress even appropriated $200 for a survey of the Muscle Shoals, Alabama, area in anticipation of building a canal there. However, the canal was not built, nor were any other navigation improvements made to the river because the responsibility of such improvements left the hands of the Federal Government and became the burden of State governments.

For the area that surrounds Nickajack Reservoir, there is a definite turning point in its social history: the Civil War. Like most of east Tennessee, the reservoir area was divided on the issue of secession. At the beginning of the war, many of the men in the valley went east to Chattanooga to enlist in the Confederate Army. Men living in the mountainous areas generally went up the valley to Cumberland County where companies were enlisted in the Union Army.

While Marion County was no major theatre of war, it became a major thoroughfare as Chattanooga became a strategic objective. If the Union Army could take and hold Chattanooga, not only would the railway supplying the Army of Northern Virginia be cut, but also the cotton commerce in northern Alabama and northern Georgia would be disrupted.

In September 1863, General Braxton Bragg defeated Union General Rosencrans at the Battle of Chickamauga. There continued a series of extremely bloody battles for control of the city at Lookout Mountain and Missionary Ridge, which ultimately wound up in Federal hands. The

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*Haden, J. Alldredge, et al. A History of Navigation of the Tennessee River System: An Interpretation of the Economic Influences of this River System in the Tennessee Valley. (Washington, 75th Congress 1st Sess., H. Doc. 254,, 1937), p. 5.

Army of Northern Virginia was cut off from needed provisions, and the only food source for the men in Chattanooga was Bridgeport, Alabama, also under Union control. From that point on, it was but a matter of time until the rebellion was crushed.

The Civil War had brought tremendous damage throughout the area. Both private and public property were ruined; however, in the reservoir area, Chattanooga was by far the hardest hit. With an 1860 population of 2,545, Chattanooga was almost completely destroyed by the competing armies. The Civil War ended, and Tennessee was readmitted to the Union in 1867. Chattanoogans were faced with the prospect of rebuilding their town completely--from scratch--but no one doubted that the town would be rebuilt and that it would become one of the important cities of the New South. In fact, city promoters, aware of the available natural resources and the potential money to be made, actually invited northern investors to Chattanooga. The railroad connections, once rebuilt, were excellent. Coal, iron, and timber were nearby. A labor force, white and black, was already pouring into the town in search of opportunities.

The influx of northern capital caused the town to grow with incredible speed. Manufacturing was big business. In 1860 Chattanooga had 22 manufacturing establishments; by 1880 the number had risen to 58. Along the rail lines, industries were springing up, many of them linked to the region's iron ore and coal deposits.

At the other end of the reservoir area in Marion County, industrial development also moved at a rapid pace. Before the war, a geological survey confirmed that there were significant coal and iron deposits in the mountains of Marion County. Around 1870, James Bowron, a noted ironmaster from London, and Thomas Whitwell, a Welsh metallurgist, worked together to form a syndicate known as the Old English Company. In 1873, the syndicate purchased 3,000 acres extending from the Tennessee River to the Cumberland Plateau. The area was to become the town of South Pittsburg.

F. P. Clute, an English engineer, was employed to survey and plan the physical structure of the town. The total enterprise comprised not only the founding of South Pittsburg but also the associated towns of Whitwell and Victoria. The undertaking had projected plans of mining the rich coal seams of the Cumberland Plateau at Whitwell and establishing coke-oven production at Victoria, to supply fuel to fire the blast furnaces at South Pittsburg.

Unfortunately, Bowron died in 1877. His death was followed in 1878 by that of Thomas Whitwell, president of the Old English Company, who was killed in a mine explosion. By strange coincidence, two of the largest stockholders of the syndicate also died within the same 2-year period. The syndicate was left without a guiding spirit and with its future uncertain--the prestigious undertaking had come to an anticlimactic end.

The industrial potential of Marion County, however, continued to attract outside investors. In the late 1880s, the Perry Stove Company of Albany, New York, relocated to South Pittsburg and was soon followed by the Sad Iron Foundary, the South Pittsburg Pipe Company, the South Pittsburg Brick and Terra Cotta Company, the Sequatchie Hoe and Tool Works, and an Eagle Pencil Factory.

Also in the late 1880s, H. I. Kimball developed his Kimball Town Community between Jasper and South Pittsburg. The major industry in this region was the Kimball Knitting Mills. The Sequatchie Town and Improvement Company, established by Glancy Sherman, was responsible for developing the town of Sequatchie between Victoria and Jasper. Improvements to the town included a modern water system and an axe handle factory.

By the end of the 19th century, Marion County was firmly established as an industrial area. A network of railroad lines connected the various places within the county with the coal fields. Industry continued to move into the area: Battle Creek Coal and Iron Company developed mines in the southwestern mountains and developed the town of Orme; the Durham Coal and Iron Company built the company town of "Shake-Rag" near the Tennessee River Gorge; the Tennessee Coke, Iron and Railroad Company established a steam-generating plant at Whitwell; Richard City, home of the Penn-Dixie plant flourished, building worker's housing, a hotel, a school, in fact, the entire city out of concrete. Little remains of this industrial image, yet the stone foundations and ruins of the entire company town of Shake-Rag still stand as a ghostly monument to that era of rapid industrialization in the reservoir area.

In 1904 Congressman John A. Moon introduced a bill that provided for the construction of a dual-purpose dam at Hales Bar. The construction cost was to be the burden of the recipient of the power franchise, which was to run for 99 years. Only the lock gates and machinery were to be provided by the Federal Government. The Chattanooga and Tennessee River Power Company agreed to build the dam, which, when completed in 1913, was known as Hales Bar Lock and Dam.

After the creation of the Tennessee Valley Authority (TVA) in 1933, construction of a series of dams on the Tennessee River provided a stairway of lakes and locks for river tows to travel the full length of the river from Paducah, Kentucky, to Knoxville, Tennessee. High dams on upstream tributary rivers provided storage capacity to prevent the winter floods that had damaged Chattanooga repeatedly.

TVA's development plan incorporated the existing Hales Bar Dam in the chain of main river projects. In the 1960s, however, the old dam was abandoned in favor of Nickajack Dam, constructed between 1964 and 1967 and located 6-1/2 miles downstream. Several factors led to the construction of Nickajack Dam, among them the long history of leakage through the limestone upon which Hales Bar Dam was built, small and inefficient generating units, and limited lock capacity. Thus, Hales Bar Dam was removed and all that remains is the powerhouse.

Until the Great Depression, both Hamilton and Marion County flourished. While the decade of the 1930s hurt Chattanooga, it did not kill it. However, the Great Depression exacted its toll on Marion County as many of the industries and coal mines were abandoned. Even the agrarian lifestyle declined. Today, most of the population of Marion County is concentrated in Jasper, South Pittsburg, and Whitwell.

Chattanooga, on the other end of the reservoir, has bounced back from the economic problems of the 1930s and remains a very commercial, New South city.

ECONOMIC DEVELOPMENT

Transportation

Nickajack Dam, located in the central part of the southern half of Marion County, is roughly equidistant from four major metropolitan areas: Nashville, Knoxville, Atlanta, and Birmingham. Interstate 24 runs through Marion County, connecting in Chattanooga with I-59 and I-75 and in Nashville with I-65 and I-40. U.S. Highways 72 and 127 provide highway connections to the southwest and northeast.

The Tennessee River is part of the interconnected inland waterway system which provides both Hamilton and Marion Counties, industries access to the Port of New Orleans via the Mississippi River and the Port of Mobile via the Tennessee-Tombigbee Waterway.

CSX Transportation has main line rail trackage through the county with direct connections to Chattanooga, Nashville, and the entire Southeast. Other areas of the county are served by the Sequatchie Valley Branch Line Railroad, which connects with the CSX Transportation main line.

Marion County has a lighted, paved airport with a 3,500-foot runway and is 30 miles from Chattanooga's Lovell Field, which is served by Delta, Piedmont, Republic, Tennessee, and Eastern Metro Express airlines.

Industrial Development

The eastern, upstream portion of Nickajack Reservoir is located in and immediately adjacent to the Chattanooga-Hamilton County metropolitan area which serves as the industrial and service center of southeast Tennessee.

Industrial development activities related to Nickajack Reservoir are varied. The upper portion of the reservoir at Chattanooga has the fifth largest concentration of cumulative private investment of 12 areas of major industrial development along the Tennessee River. The central portion of the reservoir has not developed industrially because it is characterized by steep topography. However, along the lower portion of the reservoir, lands near the dam have suitable topography for industrial development activities.

Waterfront industrial development has occurred downstream from Nickajack Dam along Guntersville Reservoir, and non-waterfront industrial development has taken place on industrial sites and in industrial parks along the main highways and railroads within Marion County.

There are three main areas of manufacturing development in Marion County. The city of South Pittsburg is located in the southern portion of the county, along Guntersville Reservoir near I-24, and is 32 miles west of Chattanooga. South Pittsburg is the location of Lodge Manufacturing Company, Salem Carpet Mills, Pittsburg Knitting Mills, Galaxy Mills, Sequatchie Concrete Company, Space Age Manufacturing Company, Sewanee Forest Industries, and Fulton Apparel.

A bridge across the Tennessee River at South Pittsburg provides access to a 100-acre tract of former Nickajack Reservoir land now owned by the Nickajack Port Authority which is available for industrial use. The port authority has developed a barge terminal facility but no other industrial development has occurred.

The town of Jasper, the county seat, is in the central portion of the county, north of I-24, and is 27 miles west of Chattanooga. Jasper is the location of Polymer, Tennessee Consolidated Coal Company, Tokheim Corporation, Rivoli Mills, Coca-Cola Bottling Company, and Cardox Corporation. Tennol Energy Company, which closed in 1988, was a fuel ethanol plant located along I-24 downstream from Nickajack Dam. This plant was the largest single industrial investment in Tennessee in 1984 and had a barge terminal facility on Guntersville Reservoir.

The city of Whitwell is located along State Route 28 in the northern part of Marion County in the heart of the coal fields and is 24 miles from Chattanooga. Whitwell is the site of Whitwell Sportswear Company, Sequatchie Handleworks Company, and J&J Apparel Company.

Other industries located in Marion County are Serodino, Inc., and Vulcan Materials Company. Following is a list of industries in Marion County, their product, and employment as of April 1988:

Firm Name	Product	Employment
Cardox Corporation	Industrial Gas	2
Coca-Cola Bottling Company	Soft Drinks	18
Fulton Apparel	Knit Shirts	92
Galaxy Mills	Yarn	215
J&J Apparel Company	Sportswear	70
Lodge Manufacturing Company	Iron Castings	200
Pittsburg Knitting Mills	Hosiery	225
Polymer	Custom Compounding	33
Rivoli Mills	Yarn	65
Salem Carpet Mills	Yarn	276
Sequatchie Concrete Company	Concrete	35
Sequatchie Handleworks	Wood Handles	75

Firm Name	Product	Employment
Serodino, Inc.	Shipyard	20
Sewanee Forest Products, Inc.	Cut Hardwoods	20
Space Age Manufacturing Company	Fireworks	25
Tennessee Consolidated Coal Company	Coal	51
Tokheim Corporation	Hose Reels and Fuel Pumps	70
Whitwell Sportswear Company	Sportswear	105
Vulcan Materials Company	Stone Quarrying	20

This list represents 1,543 jobs in manufacturing and 95 in mining in Marion County. Coal mining activities by Tennessee Consolidated Coal Company have taken a sharp decline since June 1987. It was once the largest employer in the county, with 550 jobs, but employment dropped to 65 when the company shut down its underground mining operations.

Nickajack Reservoir is industrially significant when compared to other TVA reservoirs because of the amount of private investment at Chattanooga. However, there has been limited investment during the past 15 years because of several factors, including the lack of suitable land for development in the vicinity of Chattanooga. Currently, a new port facility, with associated land for waterfront industrial development, is under construction along Amnicola Highway in Chattanooga; when this land is available for development, there should be an increase in waterfront private investment as well as in barge traffic.

Nickajack Reservoir is important on a State, regional, and national level. The waterfront manufacturing that this reservoir provides gives employment opportunities for the fourth largest metropolitan area in the state and for people in northeast Alabama and northwest Georgia.

Navigation Development

Of the 24 barge terminal facilities on Nickajack, half are located in the Chattanooga waterfront area. All but one of the facilities are privately owned, and 19 exclusively serve the industries that own them. The remaining five facilities are available for public use and serve the transportation needs of surrounding industries. The only publicly owned facility is the Nickajack Port, located just below Nickajack Dam. The terminals have a wide variety of handling capabilities and storage facilities but are primarily intended for transfer of liquid and dry bulk commodities. Main commodity groups handled are grain and grain products; stone, sand, and gravel; coal and petroleum products; and iron and steel.

In 1985, when data were last collected, a record 35 million tons of cargo moved on the Tennessee River system. A total of 6.7 million tons (19 percent) moved through Nickajack Lock, an increase of 40 percent over the 1976 total of 4.8 million tons.

In 1985, the three major product groups moving on Nickajack Reservoir were grain and grain products (1,775,729 tons); coal and coke (1,630,731 tons); and stone, sand, and gravel (1,349,613 tons). Totals for other product groups were forest products (403,280 tons), petroleum products (397,459 tons), chemicals (197,514 tons), and iron and steel (136,645 tons). In addition, 795,074 tons of nonclassified traffic moved on the reservoir. Of the total 6.7 million tons, 2.2 million tons or 33 percent was inbound to terminals located on the reservoir and 1.7 million tons were shipped out. Through traffic originating or terminating outside Nickajack amounted to 2.1 million tons. Over 700 thousand tons of commodities moved between terminals located on the reservoir.

Nickajack currently carries a high volume of both local and through waterborne commerce. This intensive use creates a high demand for terminal and barge-related activities such as marine repair and construction, fleeting, and related services. Future developments which can add significantly to traffic on Nickajack include the enlargement of locks above it (Chickamauga, Watts Bar, and Fort Loudoun), industrial development in the upper Tennessee area, and the opening of new markets for east Tennessee products going by way of the Tennessee-Tombigbee Waterway. Current projections are that traffic through Nickajack Lock will increase to over 8.5 million tons in the year 2005.

During the construction of Nickajack Dam, TVA graded and riprapped the underwater portion of the shoreline at two sites, Ladds, Tennessee River Mile (TRM) 429, and Haletown, TRM 430, for the development of barge terminal facilities. An industrial easement for a portion of the land at Haletown was sold to Serodino, Inc., a barge building facility. Serodino was located along the banks of Guntersville Reservoir before construction was started on Nickajack Dam and relocated to the Haletown site a few months before the reservoir was impounded. No development has occurred on the remainder of the Haletown site or at the Ladds site, where the backlying land is in private ownership.

Power Generation

Nickajack Dam has four hydroelectric units with a total installed generating capacity of 100,350 kilowatts. It replaced the old Hales Bar Dam acquired by TVA when it bought the Tennessee Electric Power Company in 1940. The Hales Bar Dam spillway section was later removed.

Further upstream at TRM 445 is TVA's Raccoon Mountain Pumped Storage Project, which was completed in 1978. It has the largest pump turbines in the world. The four units have a total generating capacity of 1,530,000 kilowatts. The Raccoon Mountain Project pumps water from Nickajack Reservoir to a 528-acre reservoir on top of Raccoon Mountain during periods of low power demand. The water is then stored in the upper reservoir until it is needed to generate power. During periods of high power demand the stored water is released through turbines back into Nickajack Reservoir to generate electricity.

ENVIRONMENTAL QUALITY

Air Quality

Tennessee has adopted the National Ambient Air Quality Standards, which limit concentrations in the outside air of six pollutants: particulate matter, sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, and lead. These standards are designed to protect public health and welfare. Tennessee has also established ambient standards for gaseous fluorides.

An area where any air quality standard is violated is designated as a nonattainment area for that pollutant, and emissions of that pollutant from new or expanding sources are carefully controlled.

On November 19, 1989, Hamilton County was redesignated from nonattainment to attainment for ozone. On July 1, 1987, the standards for total suspended particulates were replaced with the PM_{10} standard for respirable particulates. Prior to that date, the Chattanooga Metropolitan Area was designated as nonattainment of the secondary standard for total suspended particulates. However, EPA considers the area in compliance with the PM_{10} standard. There are no other nonattainment conditions in the reservoir area.

Tennessee has also adopted Prevention of Significant Deterioration (PSD) Regulations. Under these regulations, national parks and wilderness areas are designated Class I air quality areas, which are specially protected. A new or expanding major air pollutant source within 50 kilometers (km) of a Class I area would be required to estimate potential impact on the air quality of that Class I area.

In addition, the Federal land management agency having jurisdiction over Class I areas may request similar action for large sources at distances of 50 to 100 km. The only Class I area within 100 km is the Cohutta National Wilderness Area, which is about 70 km east of the upper end and about 90 km east of the lower end of Nickajack Reservoir.

Visual Quality

Nickajack Reservoir's visual resources provide a wide variety of landscapes. They vary from the riverine tailwater below Chickamauga Dam through downtown Chattanooga and the Tennessee River Gorge to an open lake expanse above Nickajack Dam. Over two-thirds of the reservoir is riverine in appearance. As the Tennessee River passes through downtown Chattanooga, numerous industries, barge terminals, utility crossings, and outfall pipes are the dominant visual features. Views of the waterway are of greater value to the land-based observer than are views of the shoreline economic development activities as seen by the passing boater.

Lookout Mountain on the left bank and Signal Mountain on the right bank mark a notable change in scenic resources passing downstream from Chattanooga. Signal Mountain marks the entrance to "The Grand Canyon of the Tennessee River." The steep and wooded left bank of the reservoir is countered on the right bank by a 5- to 6-mile stretch of shoreline dotted with primary and secondary residences, shacks, condominium developments, junk cars, and occasional commercial operations.

Moving downstream, the gorge's high bluff-like walls tower upward more than 1,000 feet from the shoreline, affording spectacular views from overlooks on Raccoon Mountain and various points in Prentice Cooper State Forest. Two cove-like embayments, Cummings Lake and Mullins Cove, are adjacent to the riverway as it passes through the gorge. The scenic, pastoral settings adjacent to these embayments are visible to passing boaters. The gorge provides many scenic vistas from adjacent overlooks and roadside pulloffs along the riverway and provides the Nickajack Reservoir area and the entire Tennessee River Valley with a unique scenic resource.

Moving downstream from the gorge past Bennett Lake with its massive quarrying operation, the reservoir takes on an industrial commercial tone. The old Hales Bar Dam Powerhouse protrudes into the reservoir from the left bank and is the location of a commercial marina and campground. Across the reservoir on the right bank is a coal barge loading terminal. Immediately downstream of Hales Bar Marina on the left bank is a barge servicing facility that occupies a fleeting area over half the width of the reservoir. These four operations are the predominant visual features in the landscape as seen by motorists looking upstream from the U.S. Highway 41, 64, and 72 bridge and those crossing the reservoir on Interstate 24.

Views downstream from the Interstate 24 crossing and rest area have a higher aesthetic quality. The reservoir widens at this point, taking on a more lake-like appearance. The left bank landscape is mountainous in nature, while the northern shoreline has a ridge-like character. Portions of Sand Mountain forming the reservoir's southern shoreline are interrupted with numerous powerline cuts, railroad cuts and fills, and a varied assortment of developments along State Highway 156.

Of greatest scenic value in this area of the reservoir is Nickajack Cave. Little Cedar Mountain, located on the right bank of the reservoir, is a composite of landscapes ranging from relatively level agricultural fields skirting much of the shoreline to one dominant ridge area with a scenic bluff dropping into the lake at its southernmost tip.

Water Quality

The State of Tennessee classifies streams and rivers for seven uses: domestic water supply, industrial water supply, fish and aquatic life, recreation, irrigation, livestock watering and wildlife, and navigation. The Tennessee River through Nickajack Reservoir is classified acceptable for all seven uses except for the reach between TRM 448 and 460. This reach is classified acceptable for all uses except domestic water supply and recreation.

The three major factors affecting water quality in Nickajack Reservoir are: (1) most of the water inflow to the reservoir is from Chickamauga Reservoir, (2) the residence time of water in the reservoir is short, and (3) municipal and industrial wastewater and runoff from the Chattanooga metropolitan area enter at the reservoir's upper end. The primary water quality concerns are (1) impacts on aquatic life of low dissolved oxygen (DO), (2) impacts on recreation as a result of excessive growth of algae and aquatic weeds and potential impacts of these on future water supplies in the lower reach of the reservoir, (3) impacts on recreation because of bacterial contamination, (4) impacts on aquatic life from toxic materials, and (5) impacts on aesthetics resulting from high color of wastewater discharge.

Dissolved Oxygen - Because more than 95 percent of the inflow is released through Chickamauga Dam, those releases are critical to the water quality of Nickajack Reservoir. TVA maintains a 6,000-cubic-foot-per-second (cfs) minimum average daily flow from Chickamauga Dam to maintain water quality in Nickajack Reservoir. A DO concentration of 5 milligrams per liter (mg/L) is required to protect aquatic life in the reservoir. While DO seldom drops below 5 mg/L in the releases from Chickamauga, except during periods of very low flow, summer DO is seldom much above 5 mg/L either. Recent analyses indicate that for flows of 6,000 to 8,000 cfs, DO in the river downstream of the Moccasin Bend discharge is about 1 mg/L less than in the releases from Chickamauga Dam. Therefore, summer DO concentrations in parts of the river may be below the State standard of 5 mg/L during low flow periods. This limited assimilative capacity will be a major factor to consider in planning for Chattanooga's future growth.

The average residence time (approximately three days) of water in Nickajack Reservoir is a major factor in preventing low DO from occurring except in some of the tributary embayments and shallow overbank areas. The residence time in these protected areas is longer because of the slow exchange rate with waters in the main channel. Even when DO in the river below the Moccasin Bend discharge is below 5 mg/L, sufficient reoxygenation occurs before the water reaches Nickajack Dam to keep DO in the releases from Nickajack Dam above 5 mg/L almost all the time.

Algae and Aquatic Weeds - Nearly all the nutrients in Nickajack Reservoir enter at Chattanooga, primarily in the inflow from Chickamauga Dam or from local sewage treatment systems. Nutrients are necessary for the growth of algae and aquatic plants. Algae form the base of the food chain in reservoirs, and in general luxuriant growth is associated with larger standing crops of fish and other aquatic life. However, excessive growth will produce nuisance problems affecting recreation, aquatic life, and water supplies. Nickajack does not have algal problems, in part because of the shape of the reservoir and the high velocity of the water flowing through it. A study in 1980 indicated, however, that excessive growth of the noxious blue-green algae could occur if there were a significant increase in nutrients.

Of TVA reservoirs, Nickajack has the third largest percentage of its surface area infested with aquatic weeds--14 percent or 1,400 acres. This is an increase from 11 percent in the early 1980s and probably reflects the more favorable growing conditions during the recent drought. Enrichment of areas such as the relatively shallow overbanks and protected embayments in the lower end of the reservoir by local sources, through development without consideration for waste disposal, could encourage additional algal and weed growth.

Bacterial Contamination - Another impact of Chattanooga on Nickajack's water quality comes from high bacteria concentrations from sewage system bypasses and combined sewer overflows. From a historic perspective, discharges from the city of Chattanooga, industries, and other communities discharging to tributary streams such as Chattanooga Creek (TRM 460.6) and South Chickamauga Creek (TRM 468.2) have affected water quality conditions in Nickajack Reservoir, and formerly Hales Bar Reservoir, since the founding of TVA. TVA's first assessment of water quality of the Tennessee River system identified extensive bacteria contamination of Hales Bar Reservoir at Chattanooga in 1937.

The older downtown portion of Chattanooga is served by a combined sewer collection system. This type of system was used around the turn of the century to convey a combination of sanitary sewage and stormwater runoff. In rainy weather the storm flows exceed the capacity of the sewer lines and they overflow, delivering the untreated sewage and storm water to the river. Along the bank of the Tennessee River from Citico Creek (TRM 465.2) to Chattanooga Creek (TRM 460.6) there are 15 combined sewer outfalls which may overflow to the river. Also, the main bypasses for the Moccasin Bend Treatment Plant and the Mountain Creek Pump Station may discharge in the event of major pump failure or unusual system overload. Twenty-four other relief points in the city's system may discharge to tributary streams during heavy rainfall. After a heavy rainfall the combined sewer overflow causes an increase in bacteria and nutrient levels and a decrease in dissolved oxygen concentrations because of large oxygen demand. The extent and duration of these water quality impacts are directly related to the intensity and duration of the rainfall event and antecedent rainfall conditions. However, most of the time they are of short duration.

Bacteriological conditions in Nickajack Reservoir have improved greatly as wastewater treatment at Chattanooga has improved and industries have removed their discharges from tributary streams and connected to the regional treatment facility at Moccasin Bend. The last and most extensive upgrading of this treatment facility was completed in 1984 and was designed to handle wastewater from the Chattanooga metropolitan area to the year 2004. During the 1982-84 plant expansion, required bypasses caused bacteria concentrations to exceed recreation criteria as far downstream as Nickajack Dam. However, since its expansion, the plant has consistently met the requirements of its discharge permit. Water quality criteria for recreation are frequently exceeded downstream of the Moccasin Bend sewage treatment plant. However, Tennessee does not consider the stream reach immediately below a sewage discharge suitable for recreation use, which is why the reach between TRM 448 and 460 is not classified for recreation.

Toxic Materials - Across the Tennessee River from the Moccasin Bend sewage treatment plant is Chattanooga Creek. Past industrial discharges have resulted in high concentrations of many toxic materials in the stream sediment and concentrations of six toxic materials in the water that exceed standards for either aquatic life or human consumption. Although the stream is posted to warn against any contact, studies indicate that the toxics in the stream do not pose a threat to the Tennessee River.

Aesthetics - The outfall for the Moccasin Bend wastewater treatment plant is located at Tennessee River mile 457.8, just downstream of Moccasin Bend. Over half the wastewater treated at the facility comes from industries, some with highly colored waste. The treatment provided does not remove this color; therefore, the wastewater is highly visible as it is discharged into the Tennessee River at mid-channel. The aesthetically objectionable condition caused by the outfall extends for about 2 to 3 miles to and alongside Williams Island. The increased recreational use of the river, coupled with the public's increased environmental awareness, has resulted in numerous complaints about the colored effluent. The Tennessee Department of Health and Environment has requested the city to investigate and to correct the situation.

RECREATION

TVA recognized in the early sixties that the Nickajack project would affect local governments and initiated a series of meetings in Marion County to discuss planning for area development. As a result, the Marion County Planning Commission was organized and, along with the Tennessee State Planning Commission, prepared "A Plan for Development, Nickajack Reservoir Area" in 1965 to guide recreation development and other land uses on the reservoir. Existing recreation development such as Marion County Park, Hales Bar Marina, and Running Water Campground resulted from recommendations presented in the land use plan. The plan also identified a 600-acre portion of TVA's Little Cedar Mountain property as a major recreation development site because (1) regional access via I-24 and US 41/64/72 was excellent, and (2) the site represented the only suitable location for intensive recreation development on the reservoir. The Tennessee Department of Conservation (TDOC) completed a master plan for a State resort park on Little Cedar Mountain in June 1973. The poor economy of the seventies and changes in TDOC policy prevented subsequent efforts to get the park development off the ground.

While the high recreation potential of Nickajack Reservoir was recognized in the earliest planning for the project, it was also recognized that the full recreation potential of the new reservoir would not be realized unless conditions contributing to pollution, which was a matter of record on Hales Bar Reservoir, were corrected. With the improvement of Chattanooga's sewage treatment facility at Moccasin Bend in the late sixties and early eighties, water quality problems related to water-contact recreation activities were virtually eliminated in the lower third of the reservoir.

In 1980, when data were last collected, recreation development on Nickajack Reservoir was valued at $4 million--the lowest of TVA's mainstream reservoirs. There were 600,000 annual recreation visits to the reservoir. The annual Fall Color Cruise, the major recreation event on the reservoir, attracts 80,000 to 100,000 visitors for special events to TVA's Shellmound Recreation Area during a two-week period in October. Existing recreation development on Nickajack Reservoir includes:

Upper third of the reservoir

- Two city parks
- Four golf courses
- One commercial recreation area
- Two TVA recreation areas
- Three boat launching ramps
- One national military park

Middle third of the reservoir

- Two commercial recreation areas
- Three boat launching ramps
- Two TVA recreation areas
- One State forest and wildlife management area
- One national military park

Lower third of the reservoir

- Two commercial recreation areas
- Two county parks
- Nine boat launching ramps
- Two interstate rest areas
- Five TVA recreation areas

Commercial Recreation

Commercial recreation development on Nickajack Reservoir is limited to one full-service marina, one small marina, and three commercial docks (typically limited to gas, food, or temporary docking services). Ninety-six slips are available for docking space on the reservoir. Previous water-quality problems undoubtedly hindered development of commercial recreation services and contributed to the lack of other full-service marina developments. At TRM 431, Hales Bar Marina represents the only full-service marina on the mainstream of the Tennessee River from Chickamauga Dam, TRM 471, downriver to Guntersville Reservoir at TRM 386.

Natural Areas

Few designated natural areas can be found on Nickajack Reservoir; however, many such areas occur away from the reservoir on the Cumberland escarpment. South Cumberland Recreation Area, including Foster Falls Small Wild Area, Grundy State Forest, Savage Gulf State Natural Area, Fiery Gizzard Trail, Buggy Top Cave, and Sewanee Natural Bridge are perhaps the most significant and well-known.

From TRM 432 to TRM 456, the Tennessee River forms what is referred to as the "Grand Canyon of the Tennessee." Much of the land in this narrow, steep-walled gorge is relatively unspoiled in character and is publicly owned or in large private land holdings (TVA's Raccoon Mountain Pumped-Storage Facility, Prentice-Cooper State Forest and Wildlife Management Area, Hiwassee Land Company, etc.). In 1983, The Nature Conservancy (TNC) began efforts

to protect the scenic beauty of the river gorge. Ecological surveys revealed an array of rare plant and animal species. Twenty specific natural areas were identified through biological inventories. Hicks Gap, which provides habitat for the largest known population of the federally endangered large-flowered skullcap (Scutellaria montana) is now a State-designated Class II natural area on Prentice Cooper State Forest and Wildlife Management Area. TVA also entered into a memorandum of understanding with TNC to protect scenic resources on TVA-managed lands in the gorge, especially those occurring in the area of the Raccoon Mountain Pumped Storage Facility. The Tennessee River Gorge Trust, Inc., was formed in 1986 to further these protection efforts.

The most outstanding geologic feature within the reservoir area is Nickajack Cave. It played a significant role during early settlement and has a long and colorful history. President George Washington once ordered a land survey from "Natchez to Nickajack." An impressive landmark before impoundment, the mouth of the cave was 140 feet wide and 50 feet high. The cave provided refuge for Indians and river pirates who preyed upon travelers on the Tennessee River. It was the focus of a sensational cave rescue attempt and was mined for saltpeter during the Civil War. For a time after the war, it had a dance floor,

> ". . . where it is cool and shady even on the hottest day, the young folks made merry to the tune of the fiddle, or waited out the dances in the cool, dim darkness beyond.*

At this well-known tourist attraction, visitors could take a three-hour boat trip into the cave on the "River of Darkness." A huge flowstone formation within the cave, referred to as "Mr. Big," is 60 feet high and 75 feet in diameter.

Nickajack Reservoir now floods the lower half of the entrance, which was fenced in 1981 to protect populations of federally endangered gray and Indiana bats that use the unflooded portion of the cave. In 1985, the cave was designated by the Tennessee Wildlife Resources Agency (TWRA) as a Wildlife Observation Area. It provides an opportunity for the public to witness the hour-long evening emergence of approximately 125,000 gray bats as they leave the cave to feed on insects over Nickajack Reservoir. Not far from Nickajack Cave, three States, Alabama, Georgia, and Tennessee, come together at a tri-State marker.

Public Recreation

TVA has developed and operates nine recreation areas on Nickajack Reservoir, including facilities on Nickajack and Chickamauga Dam Reservations and at the Raccoon Mountain Pumped-Storage Facility. These include one fee campground, four nonfee recreation areas, one combination fee campground/nonfee recreation area, and three boat launching areas. Facilities vary from site to site but may include boat launching ramps, trails, swimming beaches, camping and picnicking facilities, and restrooms. This development represents an initial investment by TVA of $315,000 (excluding those at Raccoon Mountain) in recreation facilities on Nickajack Reservoir.

*"Few Visitors Have Ventured Far Into Cave," newspaper account, clipping file, historical collection. Chattanooga Public Library.

The National Park Service manages the Chickamauga and Chattanooga National Military Park, the first of four national military parks established between 1890 and 1899. The park contains about 8,000 acres dispersed among six major management areas in the Chattanooga vicinity. Two of these, Lookout Mountain and Signal Point Reservation, contain about 2,800 acres located adjacent to Nickajack Reservoir. An extensive trail network, in addition to picnicking and visitor facilities, is provided. The park is a major attraction for tourists from all over the United States.

Prentice Cooper State Forest and Wildlife Management Area provides 26,000 acres of forested land for a variety of passive outdoor recreation pursuits. This area contains 40 miles of hiking trails which are part of the State-designated Cumberland Trail, two picnic areas, and primitive camping areas. The area is predominantly used by local residents, with increasing use of the area being attributed to rock climbers and off-road vehicle users.

The Tennessee Wildlife Resources Agency developed and maintains the Suck Creek and Bennett Lake water access areas. Facilities include concrete boat ramps and 40- and 20-space parking lots respectively.

There are two county parks, two city parks, and one municipal golf course adjacent to the reservoir. All the municipal facilities are in the Chattanooga area. Marion County manages two parks on TVA land in the lower portion of the reservoir. There are no local recreation facilities developed on the middle portion of the reservoir.

The City of Chattanooga and Hamilton County have taken the lead in promoting and developing a riverfront redevelopment that will extend from Chickamauga Dam 26 miles downstream to the Hamilton/Marion County line. As one component of this project, construction was completed in May 1989 on $4.3 million in new recreation development along 2 miles just below Chickamauga Dam. The park represents a trend by local governments to develop/manage greenway corridors that are viewed as a dwindling resource vital to future recreation needs.

RESOURCE MANAGEMENT

Agriculture

Agriculture is important in the two-county area around Nickajack Reservoir. In 1982, there were 940 farms in Marion and Hamilton Counties with sales of all farm products totaling $16.5 million, an increase of $1.9 million since 1978. Land in farms totaled 233,428 acres, an increase of 10,000 acres over 1978, with the average farm size increasing slightly to 141 acres. Total cropland and harvested cropland increased slightly to 65,408 and 32,915 acres respectively.

The major farm products sold are livestock and poultry. Approximately 20,000 head of cattle and calves are produced in the two-county area. Soybeans are by far the leading crop produced utilizing 13,300 acres. Although the area is insignificant nationally as an agricultural area, the reservoir's close proximity to metropolitan markets like Chattanooga and Knoxville provides good potential for increased high value crops such as fruits and vegetables.

Compared to other TVA reservoirs, Nickajack has very little prime farmland. Concentrations occur on the north bank below Nickajack Dam and in the Little Cedar Mountain area. The total land base available for agriculture in the reservoir area will likely decrease in the next 10 to 20 years as a result of increased pressure for industrial, commercial recreation, and residential development.

Fisheries and Aquatic Ecology

Nickajack Reservoir contains a variety of aquatic habitats. Approximately 75 percent of the reservoir from Tennessee River Mile 436.0 to Chickamauga Dam (TRM 471.0) can be classified as riverine, with a narrow width, fast currents, and relatively little overbank area. Downstream of TRM 436.0, the reservoir becomes lacustrine, as characterized by more numerous embayments and overbank areas, an increase in width, and a reduction in current velocity. Submersed aquatic macrophytes are present throughout the reservoir with increased colonization occurring in the lacustrine region. This variety of habitat supports a diverse fish community with a total of 65 species reported from population studies.

Fisheries cove rotenone data for Nickajack Reservoir is limited to four cove areas which were sampled during 1972 and 1977 to 1981. During 1980, additional areas immediately adjacent to two of the original coves were sampled, giving the equivalent of six sample areas for that year. Population trends observed during the 1977 to 1981 period showed increases in redear sunfish, largemouth bass, and brook silverside. These trends were attributed primarily to the increasing densities of aquatic macrophytes. Since these data represent a relatively short biological time period and fish populations fluctuate in "cyclic" patterns of varying durations, it is not possible to determine the present population status. However, since aquatic plant infestations on Nickajack Reservoir have generally increased since the 1977-1981 period, it is probable that the present fish population continues to be comprised of large numbers of species which favor this type of environment. An examination of the available sport fishing creel information tends to support this hypothesis.

A comparison of creel data collected by TVA (July 1, 1976, through June 30, 1977) with those collected during 1988 by the Tennessee Wildlife Resources Agency indicates an increase in the estimated number of fish species caught. In decreasing order of abundance, fisherman catches in 1988 were comprised of bluegill, largemouth bass, redear sunfish, white bass, channel catfish, spotted bass, black crappie, and blue catfish. The average catch rate during this period was 0.25 fish per hour.

Commercial fishermen tend to work both Nickajack and Chickamauga Reservoirs as a single fishing region. Therefore, the number of commercial fishermen using Nickajack is considered to be the same as that for Chickamauga. At present, Nickajack has about 20 to 25 full-time licensed net fishermen, and 100 trotline and slat basket fishermen. Buffalo harvest has been consistent over the last several years while paddlefish harvest has decreased. The harvest of channel catfish during this period has increased.

Mussels - No extensive survey of mussel resources has been conducted in Nickajack Reservoir. In 1978, TVA biologists made brief, random scuba dives at ten sites between TRM 454.0 and TRM 469.0. The results from those dives suggest the fauna consists of relatively few species and is fairly sparse. There is no known commercial mussel fishery on Nickajack Reservoir.

Mussel resources in the immediate tailwater of Nickajack Dam also have been sampled only briefly. In 1978, TVA biologists examined seven sites between the dam and TRM 417.0. No extensive mussel stocks or particular diversity were encountered. More extensive mussel beds and a limited commercial mussel fishery are found further downstream in Guntersville Reservoir.

The State of Tennessee has established two mollusk sanctuaries in or adjacent to Nickajack Reservoir. One sanctuary extends from TRM 465.9 upstream to Chickamauga Dam. The other runs from the Alabama State line (TRM 416.5) to Nickajack Dam. Collecting mollusks or disturbing mollusk habitat in these sanctuaries without State permission is prohibited.

Threatened and Endangered Species - As indicated previously, the aquatic fauna of Nickajack Reservoir has not been studied extensively. The only aquatic species listed as either endangered or threatened by the U.S. Fish and Wildlife Service and known to occur in Nickajack Reservoir is the snail darter, Percina tanasi. This fish, now on the Federal threatened species list, was thought to survive only in the Hiwassee River until it was discovered in South Chickamauga Creek in 1980. Searching in the adjacent reach of the Tennessee River resulted in the sighting of four individuals near TRM 468.0. Since then, snail darter populations have been found in several Tennessee River tributary streams from the Paint Rock River in Alabama to Sewee Creek near Watts Bar Dam.

In South Chickamauga Creek, snail darters have been observed from the mouth upstream to creek mile 19.0. In 1981, similar investigations located a small snail darter population in the downstream reach of the Sequatchie River (to river mile 17.0) and in the adjacent section of the Tennessee River (the Nickajack Dam tailwater). If these are like other snail darter populations, each year adult fish move up into the smaller stream to spawn. Later in the year, surviving adults and young fish drift down into the Tennessee River as they begin to move

around. Unhampered movement between both habitats appears to be necessary for the continuation of each population. The South Chickamauga Creek population, at least, seems to have been able to tolerate considerable human impact, including sewage outfalls, urban runoff, and some channelization.

Physical/Chemical Influences - Chemical contaminants have been found in catfish collected from Nickajack Reservoir as part of TVA's Valley-wide Fish Tissue Screening Study. Individuals collected during the study showed relatively high levels of polychlorinated biphenyls (PCBs) and chlordane. Additional catfish, largemouth bass, crappie, and smallmouth buffalo were collected in autumn 1988 from several areas of the reservoir to confirm these results.

Results from analyses of these fish were recently provided to State public health experts who are to determine if a fish consumption advisory is warranted. This decision is expected by the end of the 1989 calendar year. In the interim, plans have been made to continue the collection of fish from Nickajack to further define the situation.

Aquatic Plants - From 1980 to 1986 submersed aquatic plant infestations on Nickajack Reservoir have ranged from 1,025 to 1,485 acres. The peak of 1,485 acres, representing about 14 percent of the reservoir's surface area, occurred in 1986. This represents an approximate 300-acre increase from 1985 and corresponds to a general aquatic plant expansion that occurred throughout the TVA reservoir system. During the period from 1980 to 1986, species composition has shifted from a community dominated by Eurasian watermilfoil to a mixed community of Eurasian watermilfoil and spinyleaf naiad. The largest acreages of plants occur from the Mullins Cove area (TRM 437) downstream to Nickajack Dam.

Herbicide treatments are used to control aquatic weeds in areas where they conflict with reservoir use. High priority areas generally include areas around commercial marinas, public use areas, campgrounds and resorts, residences, and industrial raw water intakes, and in areas with dense weed infestations associated with high mosquito production. The majority of the priority treatment areas on Nickajack Reservoir are in the vicinity of Nickajack Dam (TRM 425 to 426), in the area from Interstate 24 upstream to old Hales Bar Dam (TRM 429 to 431), in Bennett's Lake, and from Mullins Cove upstream to TRM 440. In 1987, 262 acres were treated on Nickajack Reservoir to control aquatic plants in priority areas.

In terms of the percentage of infested reservoir surface area, Nickajack Reservoir is exceeded only by Guntersville and Chickamauga Reservoirs. However, the acreage requiring herbicide treatment on Nickajack Reservoir in 1987 was significantly less than these two reservoirs and slightly less than Kentucky, Wheeler, and Watts Bar Reservoirs. The size of Nickajack and the small amount of shoreline development largely accounts for its lower treatment requirements. Increased shoreline development for residential, recreational, or industrial purposes will increase treatment acreage requirements.

Aquatic weeds likely will continue to be a problem on Nickajack Reservoir and require maintenance control measures in priority areas. The yearly infestation level will vary with environmental conditions and is expected to range from about 1,100 to 1,500 acres. However, if noxious weed species, such as hydrilla, become established, the magnitude of the weed problem is expected to increase substantially and require greater resource allocations to maintain acceptable levels of control.

Vector Control - Current mosquito production on Nickajack Reservoir that would be of public health concern is limited to the permanent pool types (Anopheles quadrimaculatus, An. punctipennis, and Culex erraticus) and is associated with the amounts and types of aquatic vegetation present. Submersed aquatic vegetation is the dominant type associated with mosquito breeding on Nickajack Reservoir and, of this, Eurasian watermilfoil provides the best habitat. Mosquito populations will fluctuate with changes in the amount and types of submersed aquatic vegetation. General increases in infestation levels over the past ten years have resulted in accompanying increases in mosquito populations and the need for chemical treatments.

The need for chemical treatments for control of mosquitoes can also be expected to increase as development and utilization of reservoir shoreline areas increases, potentially exposing more people to mosquito bites. Chemical treatments at present are limited to five or six priority areas which are monitored weekly to determine when treatments are required.

Of the mainstream TVA reservoirs on which mosquito control operations are conducted, Nickajack ranks about sixth out of a group of eight in severity of mosquito problems. Despite this relatively low ranking among TVA reservoirs, Nickajack has significant mosquito problems when compared nationally with other freshwater impoundments. Most of the problem areas are located in the lower one-half of the reservoir and do not become a major concern until about mid-summer when submersed aquatic vegetation reaches the surface. Prior to this time, the 1-foot weekly fluctuation of lake levels is effective in controlling mosquito breeding.

Archaeology/Historic Architecture

Archaeology - The 1,000-acre lower portion of Moccasin Bend was designated a National Historic Landmark in 1986 largely through the efforts of the Chattanooga Regional Anthropological Association (CRAA), a local nonprofit organization. This acreage, scheduled to be developed as a cultural heritage park, contains 20 major archaeological sites which encompass human occupation of the Valley over the past 11,000 to 12,000 years.

Williams Island adjoins Moccasin Bend and contains 30 archaeological sites. In 1989, in a collaborative effort by CRAA and the Tennessee River Gorge Trust, Inc. (Trust), another local nonprofit organization, the State of Tennessee purchased Williams Island as a State archaeological preserve for prehistoric, historic, and natural resources. The island will be managed locally in a private/public partnership by CRAA and the Trust.

CRAA also donated efforts to delineate, interpret, and stabilize the Harwood Gulf archaeological site. In 1988 and 1989 the Trust purchased the 600-acre Grant property which adjoins the Harwood Gulf site. This area of the gorge will be used for natural and cultural education activities.

During September and October 1987, an archaeological survey of all plan lands was conducted. Fifty-six sites were found which exhibited material remains from human activity, either during prehistoric or historic times. Nine of these sites had been previously recorded and were relocated and investigated. Of the 56 sites, 28 are prehistoric, which provides mute testimony to use of this area for about 12,000 years prior to the influx of settlers in the early 1800s. Prehistoric sites located in the survey area date from nearly the earliest known period of human habitation in the Tennessee Valley to and into Mississippian times, the latest period

of prehistoric use of the area. The survey also located 28 historic sites, of which seven are cemeteries with marked graves and one is a standing structure. As with the prehistoric sites, these historic resources are representative of several temporal periods with one grave marked with the early burial date of 1820.

Several of the 56 sites are important because of their potential to provide new or additional data on the prehistory of the local area and the region. As such, these sites are possibly eligible for inclusion in the National Register of Historic Places.

Historic Architecture - There are relatively few historic sites (over 50 years old) or significant structures in the Nickajack Reservoir area as compared to other TVA reservoir areas. This is due in large part to the geographic restrictions of the Tennessee River Gorge, and to reductions in the habitable land base first in 1913 with the construction of Hales Bar Dam and then again in 1967 with the construction of Nickajack Dam. These two projects had major impacts on the reservoir area, altering and eliminating many earlier historic features. The few remaining significant features consist primarily of log houses, farm buildings, and early cemeteries.

Forestry

Of the plan lands inspected, the forest cover types and the percentage of the total they comprise are: hardwood, 35 percent; pine, 10 percent; mixed (hardwood-red cedar, hardwood-pine), 40 percent; and scrub/shrub, 15 percent. Generally, upland hardwood and mixed stands are found on the steep to moderately steep slopes, while most of the pine stands are located on areas with rolling to flat topography. Bottomland hardwood stands are limited to a few areas along the reservoir and lowland drainages.

Agricultural land use has removed forest cover from some reservoir properties; however, several old fields have been planted to loblolly pine and now represent a desirable forest situation. From a commercial forestry standpoint, most abandoned fields have reverted to undesirable and unproductive cover. In addition, construction activities below Nickajack Dam have left an area of approximately 125 acres covered with rocky, compacted soil that severely restricts establishment of a productive forest resource.

From a commercial timber standpoint, most of the forest cover is young or intermediate in age. The average stand age is 50 years (3-100), with the pine stands averaging 30 years and the hardwood 70 years.

The most productive areas from a forestry perspective are some of the upland hardwood stands, which occur on deep, moist soils. Species which characterize these stands are northern red oak, white oak, and yellow poplar. Other excellent forestry areas include approximately 165 acres of planted loblolly pine located along Shellmound Road on the north side of the reservoir.

Areas of lower forestry potential, with less desirable species composition and quality, are usually found on sites with low to moderately productive soils. Most of these stands are mixed upland hardwood-pine and usually occur on the south to southeast facing slopes. Species characteristic of these sites are southern red oak, black oak, hickory, shortleaf pine, and Virginia pine.

Several small bottomland hardwood stands are located on areas of good site quality, but the species present (red maple, sycamore, cottonwood, and sweetgum) are not as desirable as the upland oaks and pine. Portions of these stands also have severe competition from uncontrolled honeysuckle, privet, and multiflora rose.

A significant portion of the forested lands has little or no commercial forestry potential. The largest portion comprises upland hardwood-red cedar stands on poor sites with exposed limestone rocks and shallow, poor soils. These poor quality stands are a direct result of the karst topography which is common in this area of the Tennessee Valley along the Cumberland escarpment. Typical species present are red cedar, post oak, and scarlet oak.

Markets for most wood resources are present in the Nickajack area. Pine sawtimber is generally the most valuable timber resource; however, high-quality hardwood can exceed pine values. Hardwood sawtimber is primarily used for rough lumber, crossties, and tool handles; and pine is primarily used for finished lumber. Also, there are markets for both pine and hardwood pulpwood in the area. Another component, red cedar, which is prevalent on many areas of the reservoir, is also in demand.

Although from a forestry perspective Nickajack Reservoir lands are not significant when compared with other mainstream reservoirs, there is still potential for forest management on many areas. There are tracts that present excellent opportunity for hardwood management, and the pine plantations represent a forest management and financial opportunity. Opportunities also exist for future forest management on Nickajack in pine and/or hardwood planting on agricultural lands not under license and open areas. These fields have highly productive soils and, if not maintained or planted, they will probably revert naturally to commercially undesirable tree species such as sweetgum, elm, and Virginia pine.

A six-county TVA survey of wood-using industries conducted in 1982 showed limited potential for expanded forest utilization operations in the Nickajack Reservoir area. The survey concluded that past forest management practices have left much of the private forest in a poor condition with limited value. Because of these circumstances, future forestry and related operations are likely to remain at about their present levels in the reservoir area.

Threatened/Endangered Species

Several animal species listed by the U.S. Fish and Wildlife Service or the State of Tennessee as endangered, threatened, in need of management, or candidate species for Federal listing occur or have been reported in the Nickajack Reservoir study area. The gray bat (Myotis grisescens) and Indiana bat (Myotis sodalis), both federally listed endangered species, are inhabitants of caves along the reservoir. Recent censuses indicate a population of approximately 125,000 gray bats use Nickajack Cave for rearing young during the summer. This is a large increase over population levels of 10 to 15 years ago. At that time, it was possible to approach the bat roost in the cave by boat, and frequent human disturbance reduced the bat population. In 1981, TVA installed a fence across the mouth of Nickajack Cave to restrict human access, and the bat population increased significantly. Gray bats historically hibernated in Nickajack Cave, but there is no recent information on the winter bat population. The Indiana bat lives outside caves during the warm months and uses them for hibernation. Indiana bats have been

reported from Nickajack Cave, but there is no information available on current use of the cave. The eastern small-footed bat (Myotis leibii) was found in Nickajack Cave in 1950. This species is listed as in need of management in Tennessee and as a candidate species for Federal listing. The current status of this species in the Nickajack Reservoir area is unknown.

Small numbers of bald eagles (Haliaeetus leucocephalus), a federally endangered species, can be found along Nickajack Reservoir during the winter, and occasionally at other times of the year. Larger numbers, up to 10 or more, frequent TVA's Raccoon Mountain Pumped-Storage Reservoir. Bald eagles were reported to have nested in the Cummings Lake area in 1983. Between 1979 and 1985 Nickajack Reservoir accounted for 9 percent of all bald eagles counted in eastern Tennessee and ranks fourth in the number of wintering bald eagles behind Watts Bar, Norris, and Chickamauga Reservoirs. Wintering bald eagle numbers will be adversely impacted by continued development of the reservoir shoreline. The maintenance of shoreline areas isolated from urban-industrial complexes is requisite to maintaining suitable densities of wintering bald eagle populations.

Osprey (Pandion Haliaetus) historically nested along the major river systems of the Tennessee Valley, although probably not in any great numbers. Listed as endangered by the State of Tennessee, osprey are fairly common on Nickajack Reservoir with the majority of birds present during the spring and fall migrations. Biweekly aerial surveys conducted in 1979 recorded a total of 14 osprey on Nickajack Reservoir between April and September. A total of eight young osprey have been hacked by TWRA during 1980, 1981, 1982, and 1983 (two birds per year) from the Cummings Lake (TRM 442.4) area. Hacking is a technique used to rear and reintroduce raptors to historic nesting areas. A natural osprey nest with two young, located across the reservoir from Cummings Lake, was reported during the spring of 1986. The presence of osprey on Nickajack Reservoir is of both regional and local significance because of the birds' special status in Tennessee. Surviving osprey from the Nickajack hacking project should begin returning to the reservoir to nest in the next few years. These birds, along with expanding regional osprey populations, should allow numbers of osprey using Nickajack to increase during the next 10 years.

The double-crested cormorant (Phalacrocorax auritus) is listed as in need of management by the State. Although the cormorant does not breed in the Nickajack Reservoir area, small numbers occur along the reservoir from fall through spring.

The red-shouldered hawk (Buted lineatus), listed as in need of management by the State of Tennessee, is an uncommon year-round resident in the Nickajack Reservoir area. Two active red-shouldered hawk nests were found in the area in 1983. Once established, the pair usually returns to the same territory year after year. The red-shouldered hawk population in the reservoir area and surrounding region should remain stable over the next 10 years if the bottomland hardwood habitat which it requires is not reduced.

The turkey vulture (Cathartes aura) and black vulture (Coragyps atratus) occur and probably nest in the Nickajack area. Both species, listed as in need of management in Tennessee, nest in shallow caves on bluffs, in abandoned buildings, and in thick undergrowth in heavily wooded areas.

The federally endangered red-cockaded woodpecker (Picoides borealis) apparently no longer is found in the reservoir area. The species was reported in the Prentice Cooper State Forest and Wildlife Management Area in the late 1960s. In 1984, an abandoned colony site was observed in the Pot Point area of the State forest.

Two reptiles listed as in need of management by the State are fairly common in the Nickajack study area. The six-lined racerunner (Cnemidophorus sexlineatus) inhabits disturbed areas such as roadcuts and old fields. The Cumberland turtle (Pseudemys scripta troostii) is an aquatic species that is fairly common in shallow embayments.

One plant species listed by the Federal Government and one plant species which is a candidate for Federal listing occur in the study area. Five additional rare plant species are reported from the vicinity and are listed as endangered, threatened, or of special concern in Tennessee.

Large-flowered skullcap (Scutellaria montana), a federally endangered species of mint, occurs in several areas within the Tennessee River Gorge. The worldwide distribution of this mint is an area roughly 75 miles by 35 miles, centered in Chattanooga. Approximately 18,000 plants of mountain skullcap are known throughout its range and roughly 80 percent are in the gorge. The significance of the reservoir area is thus substantial.

Leafcup (Polymnia laevigata), a candidate for Federal listing, also occurs at several sites. This member of the sunflower family is found in moist, wooded areas on limestone soils. Many details of its life history and reasons for rarity are unknown.

American smoketree (Cotinus obovatus) and cylindric blazing star (Liatris cylindracea) are listed as endangered in Tennessee. American smoketree is a small- to medium-sized tree that grows on limestone bluffs or in dry, open woods. It occurs downstream from the gorge and is especially noticeable in midsummer when the fruiting trees develop their characteristic "smoky" cast. Cylindric blazing star occurs on only one area (Little Cedar Mountain) of the reservoir. This herb is 12 to 18 inches tall and is restricted to prairie-like or glade-like openings in limestone areas.

A single plant species is listed by the State of Tennessee as threatened. Ginseng (Panax quinquefolius) is reported from a few rich, wooded sites. Exact localities are not made public because of the commercial value of the roots of this species.

Hairy false gromwell (Onosmodium hispidissimum) and three-parted violet (Viola tripartita var. tripartita) are considered of special concern by the State of Tennessee. Hairy false gromwell is known from two sites along the reservoir: one on Little Cedar Mountain and one near the site of the old Hales Bar Dam. This species is restricted to open, limestone areas with thin soil. Three-parted violet is found only in rich, moist forested areas.

Wildlife

Nickajack Reservoir lands and adjacent waters provide habitat for a variety of waterfowl, upland, and wetlands wildlife species. In addition to a wide array of commonly occurring wildlife species, several threatened and/or endangered species, and/or species of special concern, as discussed above, are supported by the diverse habitats, ranging from mature upland forests to wetlands.

Wildlife Management Areas - There are no formally designated wildlife management areas (WMA) or refuges under license or easement to TWRA or the U.S. Fish and Wildlife Service on TVA's Nickajack Reservoir land base. Prentice Cooper State Forest and WMA, located on the north side of the Tennessee River Gorge, is managed by TWRA in cooperation with the Tennessee State Forestry Division. This 22,000-acre upland, predominantly wooded area is managed primarily for white-tailed deer and eastern wild turkey. Most users of the Prentice Cooper State Forest and WMA come from Marion and adjacent counties and the Chattanooga metropolitan area.

Wildlife Observation Areas (WOA) - WOAs are an important regional and national resource which have only recently begun to receive proper recognition. Revenues generated by tax deductible contributions have allowed TWRA to fund programs designed to accommodate that growing portion of the general public interested in the study, photography, and general non-consumptive enjoyment of wildlife.

Nickajack Cave WOA is the only TVA/TWRA WOA on Nickajack Reservoir. In addition, TVA's Raccoon Mountain Pumped Storage Facility is designated as a TVA WOA. This large pump-storage lake attracts several species of wintering waterfowl and, most notably, significant numbers of wintering bald eagles. As many as ten bald eagles have been observed at one time at this site during the overwintering period in recent years.

Cooperative Small Game Demonstration Areas - There is currently one cooperative small game demonstration area on TVA agricultural lands on Nickajack Reservoir. This area encompasses a 400 acre portion of the TVA land referred to as Little Cedar Mountain, located on the right bank upstream from Nickajack Dam. The Chattanooga Chapter of Quail Unlimited, a local wildlife conservation organization, entered into a cooperative agreement with TVA in April 1986 to develop wildlife habitat on these lands. The habitat management program is being accomplished through planting both annual and perennial varieties of small grains and shrubs of proven benefit to wildlife, and through the manipulation of native vegetation. TVA provides the land base, technical assistance, and some materials, while tractor work and labor are provided by the club. To date over 4,000 bicolor lespedeza seedlings and 900 pounds of small grain seed have been planted.

Riparian Shoreline - The riparian strip of TVA land from TRM 442 to 437, left bank, is an important buffer area to backlying roadside development and increasing shoreline development along the right descending shoreline of this portion of the Tennessee River Gorge. In addition to the excellent lowland forest stands in this area, there are several developing emergent and scrub/shrub wetlands along the reservoir shoreline. One particular wetland to note is located at the mouth of Harwood Gulf extending downstream to the mouth of Hugden Branch (TRM

441, left bank). This approximately 40-acre wetland developed following a large accretion of silt resulting from intense rainfalls in the spring of 1982. Wetlands of this type are uncommon throughout the Nickajack study area and provide breeding and feeding habitat for a variety of wildlife species.

White-Tailed Deer - By the early 1920s, white-tailed deer populations were almost extirpated in Tennessee and at a dangerously low level in the total Valley region. By 1950, all seven Valley States had active deer restoration programs. For many years, east Tennessee was the only portion of the State where deer were present in huntable numbers. In 1952, only 552 white-tailed deer were harvested in the entire State. However, by 1985 Tennessee's deer harvest reached a record total of 58,327 animals. The 1977 deer harvest in Marion County was 130 animals. By 1984, the harvest had risen to 466 animals, an increase of over 300 percent. The deer population within the Nickajack study area should continue to expand since the habitat within the study area is of good quality and the deer herd is below the support capacity of the land base.

Agricultural-Related Wildlife - Agricultural lands support a diversity of wildlife species including northern bobwhite quail, cottontail rabbits, mourning doves, songbirds, small mammals, and various furbearers. As land is removed from agricultural production, farm-related wildlife resources will continue to decline. However, public demand for such wildlife-related recreational opportunities is increasing.

Wood Ducks - Nickajack Reservoir presently supports a limited number of wood ducks in areas with suitable habitat. Most wood ducks on the reservoir are found between TRM 432 and 443 and are present during the spring, summer, and fall. Biweekly aerial surveys from June 1979 to October 1979 recorded an average of 22 wood ducks per survey.

Wood duck habitat on the reservoir appears to be stable at present, although development of the reservoir shoreline and destruction of riparian vegetation in wood duck use areas will have major impacts on this limited population. Wood ducks are an important regional resource and are intensively utilized by the hunting and bird watching public.

Resident Canada Geese - A flock of resident geese was established by TWRA on adjacent Chickamauga Reservoir in 1976 and currently numbers approximately 1,300 birds. Aerial surveys have sporadically recorded Canada geese on Nickajack Reservoir since 1977. Twelve geese were observed in December 1977; 4 in December 1980; 22 in January 1982; and 150 in June 1987. Although habitat for resident Canada geese is limited on Nickajack, the number of birds is expected to increase through natural reproduction and immigration of geese from surrounding reservoirs.

Migratory Ducks - Nickajack Reservoir supports moderate numbers of migrating and wintering ducks. Several species of dabbling and diving ducks are found on the reservoir with dabbling ducks the most common. The number of ducks on Nickajack can vary widely throughout the fall and winter as some migrating birds stop over and remain in the area for only a few days while others may stay the entire winter. Migrant ducks on the reservoir are closely associated with submersed aquatic bed vegetation, and larger concentrations of birds are found in areas

such as Bennett Lake, Mullins Cove, Browns Lake, and Cummings Lake. Based on biweekly aerial surveys conducted between October and March from 1977 through 1983, the number of migratory ducks per survey has ranged from a low of 209 (1977-1978) to a high of 750 (1979-1980).

The greatest impact on the amount and quality of wintering habitat for migratory waterfowl has come from the growth of the urban/industrial complex and changing agricultural practices. Habitat lost as a result of creation of the TVA reservoir system has been partially offset by management of the public land adjacent to the reservoirs and from increases in aquatic bed vegetation. Waterfowl habitat on Nickajack Reservoir is an important link along the migration corridors for many waterfowl species and is of regional significance. Waterfowl resources on Nickajack are used by both the hunting and nonhunting public.

Migrant waterfowl use and habitat on Nickajack will probably slowly decline in the next 10 years as urban development of the reservoir shoreline increases. Such development will lead to increased demand for aquatic plant control, which in turn will result in less available waterfowl habitat.

Wading Birds - The great blue heron is the dominant wading bird on Nickajack Reservoir and is most often found in shallow overbank areas which provide an abundance of fish for feeding. One hundred and five great blue herons were counted on Nickajack during the 1986 Tennessee Ornithological Society Christmas bird count. Great blue herons migrating from areas north of Tennessee also feed and rest on Nickajack during the fall and winter. Great egrets have also been recorded on Nickajack Reservoir during the late summer and early fall months of 1987.

No known nesting colonies of wading birds are currently located on Nickajack Reservoir. The number of great blue herons using this reservoir will probably increase steadily during the next 10 years if annual production from nesting colonies on adjacent reservoirs continues to increase as in recent years.

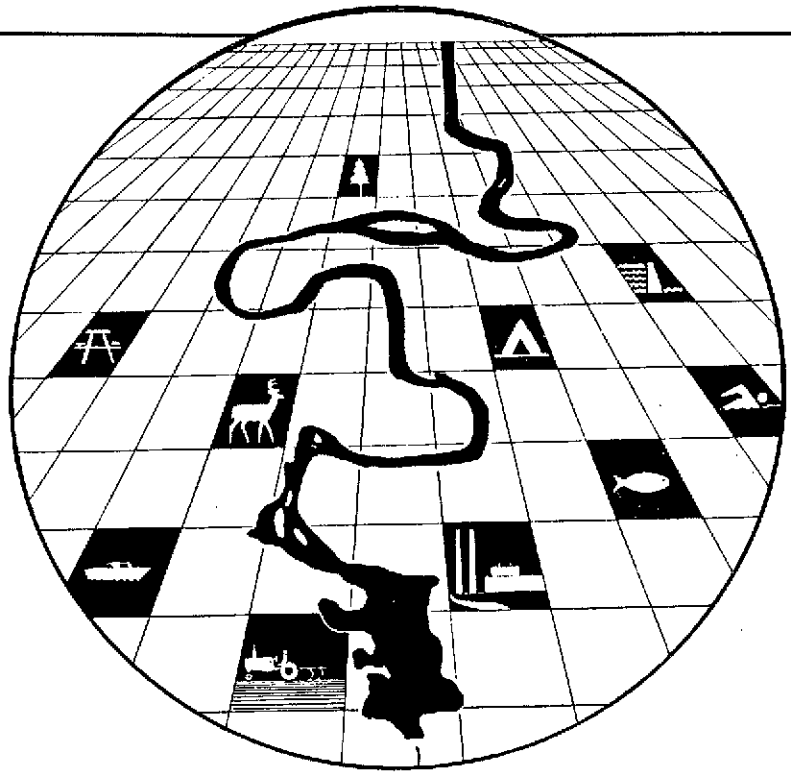
Gulls - Gulls are commonly found on Nickajack Reservoir during the fall and winter. Most of these birds are ring-billed gulls, with a few herring and Bonaparte's gulls present. In the Nickajack study area most concentrations of gulls are found roosting around exposed rock pilings and feeding above and below Nickajack Dam.

Biweekly aerial surveys since fall-winter 1977-78 have recorded peak counts of gulls ranging from a low of 24 (1978-79) to a high of 1,905 (1981-82). The most recent count as published in the 86th Audubon Christmas bird count includes 225 ring-billed gulls, 5 herring gulls, and 2 Bonaparte's gulls. Concentrations of gulls have recently received increased attention from bird watchers searching for rare species and from the general public interested in wildlife observation. Based on these uses, gull wintering and use areas on Nickajack Reservoir are considered regionally important. Inland gull populations are increasing regionally, and the number of gulls using suitable areas on Nickajack Reservoir will probably increase in the next 10 years.

Wetland Furbearers - Nickajack Reservoir is a productive area for wetland furbearers which rely on the maintenance of high-quality wetland/riparian habitats for their existence. Furbearers as a source of part-time income is significant in the Nickajack area. The total number of trapping licenses sold in Marion County for 1982-83 was 43. This was the highest number of trapping licenses sold within TWRA's 24-county Region III area and comprised 13 percent of the region's total. Statewide, wetland furbearers have considerable economic importance. For example, during 1982-83, the sale of muskrat, mink, raccoon, and beaver pelts totaled over $1.08 million in Tennessee. The population of wetland furbearers within the study area should remain relatively stable over the next 10 years unless the market for furs increases significantly.

NICKAJACK RESERVOIR PLAN

Planning Issues and Objectives



PLANNING ISSUES AND OBJECTIVES

TVA's multipurpose mission, as reflected in the reservoir land management goals contained in the INTRODUCTION to this plan, establishes the basis for a wide range of uses for TVA land on Nickajack Reservoir. To conform with TVA's broad mission, the plan identifies sites for economic development, including industry, navigation, and recreation, and provides for management of agricultural, forest, wildlife, cultural, and visual resources. The plan also reflects TVA's commitment to optimizing public benefit from the use of its land. This section focuses on the plan's strategies for balancing competing and sometimes conflicting land uses to meet TVA's goals, while at the same time being responsive to local and regional needs and values.

ECONOMIC DEVELOPMENT

TVA's reservoir land management goals include promoting economic development in the reservoir area. While the total economic impact of the use of TVA's reservoir land is difficult to measure, every potential use has some direct and/or indirect impact on the economics of the reservoir area.

Economic development is most commonly associated with such land uses as industrial, navigation, or commercial recreation development; however, various public recreation and resource management land uses also contribute significantly to the area economy. For example, wildlife management attracts hunters and other non-consumptive wildlife users who spend money at area retail establishments. Similarly, proper management of the reservoir's visual resources or aesthetics will help to maintain and enhance the area's attractiveness for recreation and tourism activities which also provide area economic benefits.

Specific issues related to the use of TVA land on Nickajack Reservoir for economic development purposes include (1) industrial development adjacent to and downstream of the dam on the right bank of the Tennessee River, and (2) recreation development of a portion of the TVA land known as Little Cedar Mountain.

The large parcel of public land (Tract No. 1 - 637.7 ac.) on the right bank of the Tennessee River, adjacent to and downstream of Nickajack Dam, and bounded on the east by Shellmound Road, was identified for industrial development by the Marion County Planning Commission, the Tennessee State Planning Commission, and TVA (A Plan for Development, Nickajack Reservoir Area, 1965) during construction of Nickajack Dam. About 125 acres of this land was filled for industrial use with material from the river diversion channel dredged during dam construction. This parcel has been promoted for industrial development by both Marion County and the Tennessee Department of Economic and Community Development.

The Little Cedar Mountain property (Tract Nos. 3 and 5 - 1,020.8 ac.) is located on the right bank of the reservoir between Nickajack Dam and Interstate 24 and includes TVA's Shellmound Recreation Area. The 1965 reservoir development plan prepared by TVA, the State, and Marion County identified 600 acres of this parcel for intensive recreation development because (1) regional access via I-24 and US 41/64/72 was excellent, (2) the site represented the only

suitable location for intensive recreation development on the reservoir, and (3) such development was seen as necessary to achieve a balanced use of reservoir shorelands. The Tennessee Department of Conservation (TDOC), with the full support of Marion County, completed a master plan for development of a State resort park on Little Cedar Mountain in 1973. However, the poor economy of the 1970s and changes in TDOC policy prevented subsequent implementation of the plan. Marion County maintained its interest in seeing the site used for commercial/ resort recreation development and requested that TVA make the land available for such use as well as for commercial office space and private residential development.

TDOC recognizes the significant opportunity for resort level recreation development of this land and realizes that such development could make a considerable contribution to the local and regional economy of the area. The department is prepared to assist in identifying and assessing options for development should a careful examination of all land use alternatives recommend such action.

While the requested uses of Tract No. 1 for industrial development and Tract Nos. 3 and 5 for recreation development are compatible with each other, all parcels (Tracts Nos. 1, 3, and 5 - 1,658.5 ac.) have been requested by TWRA, with significant support by outside organizations, for long-term wildlife management purposes. (See RESOURCE MANAGEMENT, pages 73 and 74).

Specific objectives which promote economic development on Nickajack Reservoir include:

- Cluster future industrial and navigation development facilities in two areas: the Interstate 24 bridge area and below Nickajack Dam.

This objective reflects a common desire of industrial/navigation development supporters as well as non-supporters. Proponents recognize that with clustering of development such infrastructure costs as roads, rail, and utilities can be shared. Non-supporters recognize the benefit, in terms of resource conservation, of directing such development to certain areas rather than spreading development throughout the reservoir area.

The plan seeks to maintain the overall character of the reservoir as valued by the public by accommodating industrial growth in areas that have already been developed. Three tracts have been identified for future industrial development: one along the right bank adjacent to and downstream of Nickajack Dam (Tract No. 1) and one each below the Interstate 24 bridge at Ladds (Tract No. 17) and above the Highway 41 bridge at Haletown (Tract No. 21). The Ladds and Haletown sites are also identified as future barge terminal sites and were graded and riprapped for barge terminal development prior to impoundment of the reservoir.

- Designate sites for public/private partnership investments on TVA lands to generate economic growth opportunities in the reservoir area that are focused on recreation and tourism services.

When the comprehensive land use plan was completed for Nickajack Reservoir in 1965, intensive recreation development was viewed as necessary to achieve a balanced development of shorelands. Unlike development on many other TVA reservoirs, the variety and quality of

public and private recreation development have not occurred on Nickajack because of earlier environmental, economic, and political factors. Accordingly, visitation and economic impacts are not what were envisioned in planning for the reservoir nor what they could be. Viewed in total, existing recreation development does not attract large numbers of recreators for extended periods of time.

It appears the recommendations of the 1965 reservoir developmentplan are still valid today. The missing link on Nickajack is intensive recreation development, i.e., a properly developed/ promoted focal point. The plan identifies two tracts for future recreation/tourism development that can provide a full range of recreation opportunities and services. Tract No. 3 includes the TVA land known as Little Cedar Mountain, and Tract No. 4 contains a smaller parcel located on the opposite, northern side of I-24. In addition, Tract No. 18 contains TVA's Running Water Campground for which a commercial operator is being sought, and Tract No. 20 is currently under license for commercial recreation purposes to the adjacent owner/operator of Anchor Inn Bait and Tackle Store.

ENVIRONMENTAL QUALITY

TVA's land management goal for protecting the amenities and environmental quality of the reservoir area and adjoining lands directly impacts other land management goals. Recognizing the interrelationship between environmental quality and land use, relevant environmental data were carefully analyzed prior to making any allocations. Furthermore, all development and management activities resulting from this plan will be conducted in accordance with applicable legal authorities and other environmental quality controls.

The most significant issue regarding environmental quality on Nickajack Reservoir concerns the use of TVA reservoir lands within the Tennessee River Gorge. From TRM 432 to 456, the Tennessee River forms what is referred to as the "Grand Canyon of the Tennessee." Much of the land in this narrow, steep-walled gorge is relatively unspoiled in character and is publicly owned or in large private land holdings (TVA's Raccoon Mountain Pumped-Storage Facility, Prentice-Cooper State Forest and Wildlife Management Area, Hiwassee Land Company). In 1983, the Nature Conservancy (TNC) began efforts to protect the scenic beauty of the river gorge. Ecological surveys revealed an array of rare plant and animal species. Twenty specific natural areas were identified, several of them within Prentice-Cooper State Forest.

TVA, also in 1983, entered into a Memorandum of Understanding with TNC to manage the lands under TVA control "to protect and preserve the scenic beauty of the gorge." The Tennessee River Gorge Trust, Inc., (Trust) was formed in 1986 to further these protection efforts. TVA has been supportive of the Trust's efforts and has provided funding for land appraisals and map printing. The Trust has requested that TVA transfer to it, in fee simple, all planned lands between the U.S. Highway 41 Bridge (TRM 429.8) and TRM 442, with the exception of TVA's public boat ramp at TRM 440.

Specific objectives designed to protect the amenities and environmental quality on Nickajack Reservoir include:

- Preserve TVA's reservoir lands located in the Tennessee River Gorge in their natural state.

With the exception of the small 2-acre tract located at TRM 440, left bank, which contains a TVA public boat ramp (Tract No. 30), all remaining TVA fee-owned land upstream of TRM 431 (Tract Nos. 29 and 31), including all islands, is designated for natural resource management purposes including: habitat protection, informal recreation, visual protection, and wildlife management. These lands will continue to be available for informal public recreation and wildlife habitat improvement activities; however, no development will be allowed. TVA will continue management of these lands.

- Protect the natural beauty and visual quality of TVA public land, especially the reservoir shoreline.

Overall, participants at the Nickajack public workshops listed scenic beauty of the reservoir as their highest value. Toward this objective, TVA staff completed an analysis of the visual resources on the reservoir and assigned a visual quality rating to each parcel of TVA land prior to development of this plan. The ratings identified (1) the distinctiveness of the landscape, (2) the visibility and level of concern for the landscape, and (3) acceptable management activities that could occur on the parcel. (The visual quality rating system is described in Appendix B.) Based on these ratings, four tracts were identified for visual protection, which permits no development and only low visual impact activities (Tract Nos. 5, 6, 29, and 31). Additionally, 13 tracts were designated for visual management, so that visual considerations will be built into any management or development plans for those tracts (Tract Nos. 8, 9, 10, 11, 12, 13, 15, 16, 18, 19, 24, 25, and 26). Furthermore, all tracts will be managed to minimize visual resource degradation.

- Protect reservoir water quality through land uses that will reduce erosion and sedimentation.

TVA lands with high soil erosion potential were identified through interpretation of soils data. Where appropriate, highly erodible sites were designated for various non-developmental uses so that vegetative cover could be established or maintained (various tracts).

RECREATION

TVA's reservoir land management goals include providing a diversity of quality recreation opportunities on TVA reservoirs and adjoining lands. Specific to recreation, public comment and TVA staff input resulted in the following objectives:

- Designate areas for informal recreation uses such as hunting, hiking, and bank fishing.

Participants at both public workshops highly valued areas of undisturbed shoreline along the reservoir. They cited the need for such areas to allow for hiking, nature observation, bank fishing, and other passive forms of recreation. Consequently, six tracts (Tract Nos. 6, 8, 9, 11, 24, and 29) as well as all islands were designated for informal recreation. Many of the tracts have historically received heavy informal use by the public.

- Designate areas for commercial recreation development downstream of Hales Bar Dam.

Existing commercial recreation services on Nickajack Reservoir are very limited. This plan recognizes the importance of providing a variety of facilities, services, and locations to give visitors a range of choices. In total, three tracts were designated for commercial recreation development downstream of Hales Bar Dam: one for development of a commercial (or public) campground (Tract No. 4), one for conversion of a public TVA campground to a commercial campground (Tract No. 18), and one for expansion of an existing small-scale recreation supplies/camp-ground operation (Tract No. 20).

- Retain and enhance current TVA public recreation areas.

Participants at both public workshops highly valued public recreation opportunities on Nickajack. They stressed a need for better maintenance of existing facilities with control of littering, vandalism, and general misuse.

TVA, in 1969, began providing basic recreation improvements, such as picnic facilities, boat launching ramps, access roads, and sanitary facilities, where public use indicated a need for such facilities. Over the last several years, emphasis has been placed on improving the quality of services and facilities and seeking cooperative arrangements with other parties such as commercial operators and local governments in the operation and maintenance of these areas.

On Nickajack Reservoir, TVA has developed public recreation facilities at the dam reservation (Tract Nos. 2, 3, and 7), Maple View (Tract No. 10), Running Water (Tract No. 18), and three water access sites (Tract Nos. 12, 23, and 30), as well as at the Raccoon Mountain pumped-storage facility and below Chickamauga Dam. Running Water Campground is operated under a cooperative agreement with a resident manager. Use of these areas ranges from moderate to heavy, with the Shellmound Campground and Day Use area on the dam reservation (Tract No. 3) ranking as the most popular.

No new TVA public recreation area development is anticipated within this plan's 10-year horizon. However, all existing TVA public recreation areas (Tract Nos. 2, 3, 7, 10, 12, 18, 23, and 30), as well as a small area under license to Marion County (Tract No. 22), have been designated for public recreation. In addition to the existing public recreation facilities, the plan allocates two tracts for future public development. Tract No. 3, Little Cedar Mountain is suitable for large-scale resort development, and Tract No. 4 is suitable for either public or commercial campground development.

RESOURCE MANAGEMENT

TVA's land management goal to protect and enhance the forestry, fisheries, and wildlife resources and preserve the cultural and agricultural resources on TVA lands acknowledges the importance of stewardship of the Valley's natural and cultural resources.

The plan establishes agriculture, forestry, wildlife, and cultural resource management as recognized, long-term uses for TVA land on Nickajack Reservoir. The 10-year life of the plan allows time to experience results from these resource management practices that sometimes represent significant investment by TVA or other agencies.

The major issue involving resource management on Nickajack Reservoir lands centers around competing and exclusive proposed uses of a single large parcel of TVA land referred to as Little Cedar Mountain.

As discussed under ECONOMIC DEVELOPMENT (see pages 64 and 65), TVA lands adjacent to and downstream of Nickajack Dam on the right bank (Tract No. 1 - 637.7 ac.) have been requested for industrial development by Marion County and the State Department of Economic and Community Development.

TVA lands referred to as Little Cedar Mountain (Tract Nos. 3 and 5 - 1,020.8 ac.) have been requested by Marion County for commercial/resort recreation development, to include commercial office space and residential development. In addition, the Tennessee Department of Conservation has had ongoing interest in the use of a portion of the Little Cedar Mountain lands for public recreation purposes since 1973 (see page 33).

While these two requests are compatible with each other, all of these lands (Tract Nos. 1, 3, and 5 - 1,658.5 ac.) have also been requested by TWRA for designation as a State Wildlife Management Area. TWRA's request has significant support by such organizations as Quail Unlimited, Inc., The Tennessee Field Trial Association, and the Chattanooga Retriever Club. As discussed in the RESERVOIR DESCRIPTION section (see page 57), a cooperative agreement between TVA and the Chattanooga Chapter of Quail Unlimited has been in effect since April 1986 to develop wildlife habitat on a 400-acre portion of this land. In addition, TDOC supports TWRA's interim use of this land on the basis of maintaining options for future recreation development, and recommends continuation of the existing land use, including the cooperative agreement between TVA and Quail Unlimited.

Specific objectives related to resource management on Nickajack include:

- Protect significant cultural resources, including archaeological and historical sites, throughout the reservoir area.

TVA completed a survey of the architectural, historical, and archaeological resources of the reservoir area prior to development of this plan. The survey information is recorded in the plan's data base and will be considered when any land management actions are taken. In order to promote compatible uses on the land surrounding significant archaeological sites and historic sites and structures located in the area, four tracts have been identified for cultural resource protection (Tract Nos. 5, 10, 13, and 15).

- Protect the integrity of riparian habitat areas for wildlife and erosion control benefits.

Areas of the reservoir shoreline such as that found around islands and on TVA lands within the Tennessee River Gorge (Tract Nos. 29 and 31) provide extremely important wetlands and riparian wildlife habitat. Maintenance of these areas in an undeveloped state is essential to the survival of a variety of species of waterfowl as well as bald eagle, osprey, wading birds, and furbearers. All of these areas (Tract Nos. 5, 6, 8, 9, 11, 19, 26, 27, 29, and 31) have received nondevelopmental resource management/protection designations in the plan which, in addition to providing protection for wildlife habitat, will provide erosion control benefits.

- Designate areas for the protection and management of significant wildlife resources.

The public strongly valued the reservoir's wildlife resources as adding to the natural beauty of the area. They enjoy seeing wildlife along the shoreline. They also value the hunting opportunities which the reservoir provides. The plan addresses this dichotomy between consumptive and nonconsumptive uses of wildlife by identifying land to satisfy both needs. Twelve tracts are designated for wildlife management (Tract Nos. 5, 6, 8, 9, 11, 13, 15, 16, 19, 26, 27, 29, and 31). Some will be used for non-consumptive wildlife observation areas and others for public hunting areas. Management plans for tracts with multiple-use designations will be developed with input from all affected TVA programs.

- Designate sites to provide long-term protection for sensitive plant and animal species and unique or unusual communities currently under or recommended for State or Federal protection.

Numerous rare or sensitive plant species are located in the reservoir area, and their habitats could be destroyed by improper management, heavy public use, or inappropriate development. Additionally, some reservoir lands are used by nesting osprey, wintering bald eagles, and other wildlife species of Federal or State concern. Since protection of these sensitive and/or unique habitats is important in maintaining the environmental quality of the reservoir area, the plan identifies five tracts for habitat protection areas (Tract Nos. 5, 10, 16, 26, and 31).

- Designate sites for the demonstration of proper forest management techniques and application of best management practices on these lands.

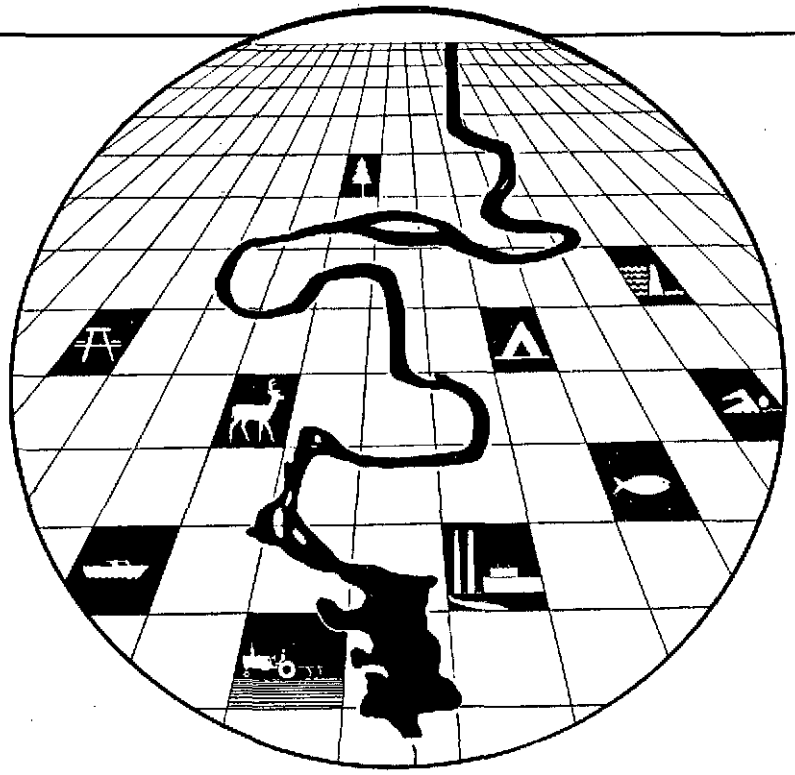
TVA land contains only a small portion of the total forest resource in the Nickajack Reservoir area, since most of the forested land is in private ownership. TVA should practice good stewardship and use appropriate lands to research and demonstrate forest management techniques applicable to the amount of land and types of forest held by private landowners in the reservoir area. The plan identifies four tracts for forest management, most of which are suitable for forest management demonstrations (Tract Nos. 8, 9, 11, and 27).

- Promote integration of natural resources through multiple-use land designations.

Of the 31 tracts identified in the plan, 14 are designated for multiple resource management. In implementing the plan, TVA programs with responsibility for each use will jointly develop specific multiuse plans for each tract.

NICKAJACK RESERVOIR PLAN

Land Uses



LAND USES

The 31 tracts of land shown on the accompanying plan map were allocated for one or more of the land uses described in this section. These descriptions establish the general limits of what can take place on tracts allocated for each use.

Other public land uses (highways, utility corridors, etc.) will be considered on any of the plan tracts and approved by TVA where appropriate. Future sites for such facilities can not be identified but will be addressed when a specific proposal is made to TVA.

ECONOMIC DEVELOPMENT

Barge Terminal Site

Tracts designated for barge terminal sites will be available to public or private entities for construction of facilities for the transfer, loading, and unloading of commodities between barges and trucks, trains, storage areas, or industrial plants. These sites would be conveyed to a developer at fair market value either at public auction sale in fee, or by easement.

Special-purpose barge terminals are associated with specific industrial plants and are owned and/or operated by one or more industries. Such terminals are not usually available to other shippers. Multipurpose terminals such as Nickajack Port are general commodity facilities available to any shipper for a fee. Multipurpose terminals can be publicly or privately owned and may provide other services such as commodity storage.

Industrial Site

Tracts designated for industrial sites will be available for development of waterfront industries. These tracts would be conveyed to a developer at fair market value either at public auction sale in fee, or by easement. TVA assistance may include feasibility studies, promotional brochures, industrial site planning, technical training, and technical assistance. Industrial developers of backlying private lands may be permitted access across TVA property for water intake, wastewater discharge, or conveyance of commodities (i.e., natural gas pipelines).

Right-of-Way Protection

On tracts designated for right-of-way protection, TVA has established vegetation to protect and stabilize the integrity of road or rail cuts or fills. These tracts will be managed to maintain the vegetative cover.

RECREATION

Commercial Recreation

Tracts designated for commercial recreation will be reserved for developments requiring water frontage. Facilities may include marinas, docks, golf courses, launching ramps, vacation rental cabins, trails, motels, pools, campgrounds, restaurants, and other outdoor recreation facilities. No private residential or non-recreational, commercial development will be permitted on these lands.

On tracts available for new commercial recreation developments, TVA will seek private investors and/or government agencies with the financial and managerial capability to develop large-scale facilities that can become destination points for tourists and local reservoir users. To encourage high-quality private development, TVA may provide such incentives as assisting with conceptual site planning; conducting feasibility and marketing studies; and assisting with road building, grading, or installation of utilities. In addition, TVA may provide technical assistance to existing commercial operators who are interested in upgrading their facilities.

Informal Recreation

Tracts designated for informal recreation will be maintained for passive dispersed recreation activities, such as hunting, hiking, bird watching, photography, primitive camping, bank fishing, and picnicking. Buildings, paved access, or development that would tend to concentrate public use will not be permitted. Forestry, agriculture, and wildlife management practices will be permitted as long as they do not limit public use of the land or drastically alter the physical land base.

Public Recreation

Tracts designated for public recreation will be made available for development by a municipal, county, State, regional, or Federal agency. TVA will consider developing or expanding selected public recreation facilities, as funds are available, in areas where facilities are needed but no other agency is in a position to develop them.

Public recreation tracts are intended to support a wide range of recreation activities. Such tracts might be developed with swimming beaches, toilets, roads, campgrounds, parking lots, game and court areas, launching ramps, and trails as well as larger scale facilities such as those found in commercial recreation areas. Large public recreation areas may have onsite managers.

Small Wild Area

Tracts designated as small wild areas have exceptional natural, scenic, or aesthetic qualities and will be available for dispersed, low-impact types of outdoor recreation, such as hiking, primitive camping, nature photography, and bird watching. Motorized vehicles are prohibited. Development may include foot trails, signs, parking areas, and primitive camping sites. Efforts will be made to encourage public use and to interpret the natural features of these areas for visitors.

Water Access

Tracts designated for water access will be available for development and/or maintenance of boat ramps, courtesy piers, and car and trailer parking areas to provide public boating access to the reservoir. TVA will take the lead in developing water access tracts, but development and maintenance could be shared with other Federal, State, county, or local agencies.

RESOURCE MANAGEMENT

Agriculture

Tracts designated for agriculture will be managed to preserve their potential for agricultural use, promote increased agricultural productivity for row crops or pasture, and demonstrate multiple-use developments compatible with preservation of agricultural lands. They contain a significant amount of prime farmland and/or farmland of Statewide importance. These tracts will be available for agricultural licensing to local farmers, with restrictions to protect topsoil, prevent erosion, and benefit wildlife.

Cultural Resource Protection

On tracts designated for cultural resource protection, TVA will protect and/or interpret significant remnants of the prehistoric and historic past. These tracts may contain archaeological or historic features, or may provide buffers to preserve the settings of structures of historic or architectural significance. This designation precludes any uses that would damage or destroy the cultural resources, or that would diminish the public's appreciation of the cultural values of the tract or adjacent land.

Forest Management

Tracts designated for forest management will be managed to demonstrate and optimize the production of forest products and economic returns while enhancing or complementing other uses, such as wildlife management and recreation. All technically acceptable silvicultural and harvesting treatments are applied in appropriate circumstances. Additional resource management activities, such as timber stand improvement, planting, control burning, cattle exclusion, road construction, kudzu control, and others, would be applied in appropriate situations. A multidisciplinary TVA team will decide which management treatments to apply on each tract to benefit the forest resources and complementary uses.

Habitat Protection Area

Tracts designated as habitat protection areas will be managed to protect populations of species that have been identified as threatened or endangered by the U.S. Fish and Wildlife Service or are considered rare in the State of Tennessee. Unusual or exemplary biological communities or unique geological features also receive protection by being placed in this category. Management activities that are not specifically designed to perpetuate the featured species or that would jeopardize the ecological quality of the site will not be permitted. Heavy public use is discouraged, and motorized vehicles are prohibited.

Visual Management and Visual Protection

Management or development proposals for tracts designated for visual management must include provisions for maintaining or enhancing the quality of the visual resources of the tract, in accordance with Visual Resource Management Recommendations contained in Appendix B. This designation does not preclude any otherwise acceptable management or development activity.

However, on tracts designated for visual protection, activities that would alter unique or important visual resources will be prohibited. This designation is incompatible with developmental uses.

Wildlife Management

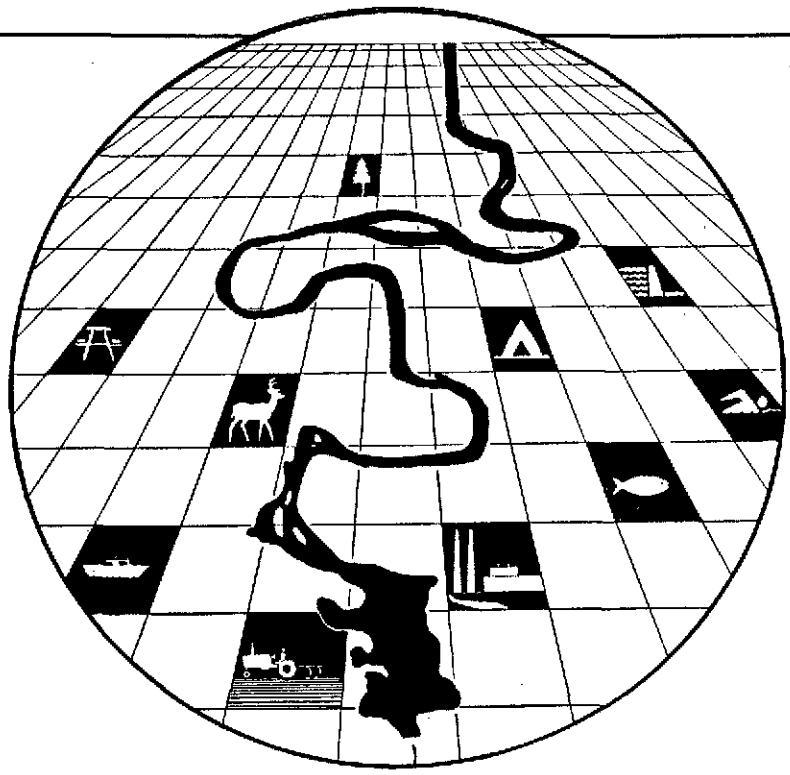
Tracts designated for wildlife management will be managed by TVA to protect and enhance wildlife habitats and to restore depleted or regionally rare populations of certain species. To accomplish these management objectives, TVA will work closely with Federal and State fish and wildlife agencies and other cooperating organizations such as Quail Unlimited, Inc.

Each tract will be managed for a featured group or groups of wildlife species (upland wildlife, wetland wildlife, or waterfowl) or, in some cases, a particular wildlife species. Existing habitat conditions on each tract were analyzed during the data gathering phase of this planning process to determine the major wildlife group or species to be featured on each tract. Tract-specific, detailed management plans will be developed where appropriate to enhance or preserve habitat conditions required by the featured group or species.

Habitat improvement will be achieved through wildlife provisions in agricultural license agreements, forest management prescriptions, cooperative agreements with other organizations, and activities funded by TVA's wildlife program. Selected tracts may be used to demonstrate or develop innovative wildlife management techniques. Tracts containing unique concentrations of easily observed wildlife may be developed as public wildlife observation areas. In some cases, especially on small or disjunct tracts, protection or maintenance of existing habitat conditions will be the best management alternative.

NICKAJACK RESERVOIR PLAN

Tract Descriptions



TRACT DESCRIPTIONS

This section describes the use or uses determined to be most suitable for each of the 31 tracts of TVA land shown on the plan map. The tract descriptions include acreage, rounded to the nearest tenth of an acre, and the planned use(s). Relevant data regarding the planned use(s) are provided for each tract and include existing land uses, physical characteristics of the land, physical capability of the tract to support the planned use(s) (excellent, good, fair, or poor), and any special considerations related to the planned use. The planned uses for each multiple-use tract are listed in alphabetical order; each use will be given equal status during implementation of the plan. Appendix B contains descriptions of the capability criteria.

Possibly unfamiliar terms used in the tract descriptions include:

1. Agricultural Licensing--Based on the criteria contained in TVA Instruction V, LAND USE, Use Of Land For Agriculture, tracts or portions of tracts designated for various long-term uses that are generally suitable for interim agricultural licensing have been identified. However, land with erosion potential will not be licensed for agricultural use unless erosion and sediment controls, including the use of best management practices, can be successfully implemented. Further investigation and/or mitigation of adverse impacts to natural and/or cultural resources may be required prior to approval of individual requests.

2. Dam Reservation--Dam reservation lands are generally maintained in a park-like setting by TVA to protect the integrity of the dam structure, hydroelectric facilities, and navigation lock; to provide public visitor access to the TVA facilities; and to provide recreation opportunities such as public boat access, bank fishing, camping, picnicking, etc.

3. Forest Net Present Value--The present value of a stand of timber which, when harvested at its financial maturity, is discounted back to the present by a predetermined discount and inflation rate.

4. Herbicide Treatment Areas--These areas of the reservoir shoreline have dense aquatic plant infestations and are generally termed "high priority treatment areas." They are located around commercial marinas, public use areas, campgrounds and resorts, residences, and industrial raw water intakes, or are associated with high mosquito production. They generally represent only a small percentage of the total weed infestation on a reservoir and are selected for treatment because they provide the greatest social and economic benefits.

5. Significant Cultural Resources--Some of the descriptions state that the tract contains significant cultural resources, or that cultural resource considerations may affect development of the tract. Many of the tract descriptions contain no reference to archaeological or other cultural resources. The lack of such references in a tract description does not necessarily indicate that significant cultural resources do not

exist. The use of any tract for developmental purposes may require additional archaeological testing or mitigation of adverse impact to archaeological sites. The costs of such required testing or mitigation may be the responsibility of the developer.

6. Prime Farmland--Land generally regarded as the best land for farming, it is flat or gently rolling and is susceptible to little or no soil erosion. Prime farmland produces the most food, feed, fiber, forage, and oil seed crops with the least amount of fuel, fertilizer, and labor. It combines favorable soil quality, growing season, and moisture supply, and under careful management can be farmed continuously and at a high level of productivity without degrading either the environment or the resource base. Prime farmland does not include land already in or committed to urban development, roads, or water storage.

7. Wetlands

Aquatic Bed Wetlands--These are wetland areas which are dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years. Aquatic beds represent a diverse group of plant communities that require surface water for optimum growth and reproduction. They exist best in relatively permanent water or under conditions of repeated flooding. The plants are either attached to the substrate or float freely in the water. The most common aquatic plants found on Nickajack Reservoir are Eurasian watermilfoil and spineyleaf naiad.

Emergent Wetland--Emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes. This type of vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. Common emergent wetland plants found on Nickajack Reservoir are cattail (Typha latifolia) and bulrushes (Juncus, Scirpus). An emergent wetland may be known by a common name such as "marsh" or "slough."

Scrub/Shrub Wetland--Scrub/shrub wetlands are areas dominated by woody vegetation less than 6m (20 feet) tall. Plant species may include true shrubs, young trees, or trees and shrubs that are small and stunted because of environmental conditions. In many situations, scrub-shrub wetlands may represent a successional stage leading to forested wetland. The most common scrub-shrub wetland plant species found on Nickajack Reservoir is black willow (Salix nigra).

Forested Wetland--Forested wetlands are comprised of woody vegetation that is 6 meters (20 feet) tall or taller. The most common forested wetlands found along Nickajack Reservoir are temporarily flooded (flooded early in the growing season in most years) riparian zones. These areas are dominated by such species as red and silver maple, elm, boxelder, sycamore, and green ash. Other forested wetlands, more commonly known as bottomlands, may be comprised of the above mentioned species in addition to water and willow oaks.

TRACT NO. 1 - (637.7 ac.)

- PLANNED USE: Industrial Site 5

- RELEVANT DATA:

This tract is located on the Nickajack Dam Reservation. It contains TVA's Fire Training Center. The industrial site and barge terminal capability of this tract is excellent. It was identified for industrial use by the Marion County Planning Commission and the State of Tennessee prior to construction of Nickajack Dam. Approximately 125 acres were filled, for industrial use, with diversion channel spoil material during construction of the dam. It has road access and rail service is within 3 miles of the site. This tract is the last piece of TVA land suitable for major waterfront industrial development on the Tennessee River between Loudon, Tennessee, and the Tennessee-Tombigbee Waterway. Industrial development may include the development of industry-specific barge terminal facilities.

Significant cultural resources exist on the tract. Historically significant structures located adjacent to the northeast boundary of the tract include a house and a country church with an adjacent late 19th century cemetery. Cultural resource considerations may affect development. The use of this tract for development of an industrial site may require additional archaeological testing or mitigation of adverse impact to archaeological sites. The costs of required testing or mitigation may be the responsibility of the developer.

The tract contains 85 percent prime farmland, and the soil erosion potential varies from slight to severe. Portions of the tract are currently licensed for row crop agricultural production, and continued licensing will be considered.

The forest resource capability ranges from excellent to good with the net present value ranging from $290 to $635 per acre. Previous investments include a pine plantation established 20 years ago which is healthy and productive. In addition, this tract contains the only good bottomland hardwood forest stand (50 ac.) on TVA land on the reservoir.

The wildlife resource capability of this tract is excellent. It provides habitat for agriculture-related wildlife species, such as quail, dove, and rabbit, and has the potential for supporting high populations of wildlife for both consumptive and non-consumptive public uses including hunting, bird watching and retriever training. TVA has made portions of the tract available under letter permit to local hunting organizations for retriever field trials. The bottomland hardwood portion of the tract provides nesting habitat for the red-shouldered hawk, listed as in need of management in Tennessee. Emergent wetlands occur along the shoreline, and forested wetlands occur within the interior of the tract.

Continued forest and wildlife resource management will be considered as appropriate interim uses of this tract, both until industrial development occur and after, depending on the specific industrial needs.

TRACT NO. 2 - (39.5 ac.)

- PLANNED USE: Public Recreation 4
- RELEVANT DATA:

This tract is located on the Nickajack Dam Reservation and contains a developed TVA campground and day-use recreation area. Facilities include a 23-unit campground used mostly by fishermen, a 9-unit picnic area, a paved boat ramp with courtesy pier, fishing berm, toilet building, and dump station. Additional development potential is long range (5-10 years).

TRACT NO. 3 - (701.2 ac.)

- PLANNED USE: Public Recreation 4
- RELEVANT DATA:

This tract, referred to as Little Cedar Mountain (LCM), is located on the right bank of the reservoir and extends from Interstate 24 downstream to Nickajack Dam.

LCM has excellent to good physical capability for intensive commercial and/or public recreation development to serve as a focal point and drawing card for Nickajack Reservoir. However, a recreation development feasibility study conducted by Economics Research Associates (ERA), completed in April 1989, found that private sector commercial recreation development was not financially feasible and recommended public sector recreation development. Additional public recreation development could include a full service resort (lodge, restaurant, golf course, cabins, swimming pool, tennis courts) in addition to expansion of the existing TVA public recreation facilities at Shellmound Recreation Area. However, no private residential or non-recreational, commercial development will be allowed.

Recognizing that economic conditions may change, TVA will consider proposals from the private sector for development of public recreation facilities. Such private sector proposals will be reviewed within TVA following established land use review procedures to ensure quality development commensurate with the site and to determine whether the proposal is in the best interest of the public. Evidence of the financial feasibility of the proposed development will be a primary consideration in TVA's review.

Cultural resource considerations may affect development. The use of this tract for development of public recreation facilities may require additional archaeological testing or mitigation of adverse impact to archaeological sites. The costs of required testing or mitigation may be the responsibility of the developer.

TVA's existing Shellmound Recreation area, located on this tract, includes a 45-unit picnic area with 2 picnic shelters, a baseball field, a multiuse court, a toilet building, playground,

paved boat ramp with courtesy pier, fishing berm, a 34-unit campground with toilet/shower building and dump station, a swimming beach, and 1/2 mile of hiking trails. In addition to Shellmound being the most popular public recreation area on Nickajack Reservoir, the Fall Color Cruise is conducted here annually in October and attracts 80,000 to 100,000 visitors to the area over a two-week period.

LCM contains 55 percent prime farmland and the soil erosion potential varies from moderate to severe. Portions of the tract are currently licensed for row crop agricultural production. Continued agricultural licensing will be considered as an appropriate interim use both until and after, as appropriate, recreation development occurs. However, where soil erosion potential is severe, row crop licenses should be discontinued and agricultural use converted to hay and pasture.

A 37-acre pine plantation was established on LCM by TVA in 1984 after concerns of erosion problems were raised by the Marion County Soil Conservation Department. The planting has stabilized the soil and is protecting the area from further erosion. A significant investment has been made in this plantation which should be maintained and managed. In addition, a portion of a 20-year-old, 52-acre pine plantation was recently thinned, and the remainder needs to be thinned. The net present value of this stand is $720 per acre, and the plantation represents a significant forestry investment. Also included in this tract are a 41 acre hardwood-pine stand which is approaching maturity, with a net present value of $980 per acre, and a stand of small sawtimber-mixed pine adjacent to Shellmound Road which will require future thinning to maintain vigor and health.

Some of the best remaining small game and upland wildlife habitat to be found on TVA public lands in the Tennessee Valley exists on this tract. TVA entered into a cooperative agreement with the Chattanooga Chapter of Quail Unlimited in April 1986 providing for wildlife habitat improvement on a 400-acre portion of the tract. Continued forest and wildlife resource management will be considered appropriate interim uses both until and after recreation development occurs. Aquatic bed wetlands occur along portions of the shoreline which are herbicide treatment areas.

TRACT NO. 4 - (39.4 ac.)

- PLANNED USE: Commercial Recreation
  Public Recreation

- RELEVANT DATA:

This tract is located across Interstate 24 from LCM in the Rankin Cove Area and is bordered by the Interstate, U.S. Highway 41, and the reservoir. It receives heavy informal recreation use. The character of the site, including its gentle slope, high visibility, and easy accessibility, make it highly attractive for public or commercial recreation development. Aquatic bed wetlands occur along the shoreline, which is a herbicide treatment area.

TRACT NO. 5 - (319.6 ac.)

- PLANNED USE: 3
  Cultural Resource Protection
  Habitat Protection Area
  Small Wild Area
  Visual Protection
  Wildlife Management

- RELEVANT DATA:

This tract consists of Little Cedar Mountain proper. It contains significant cultural resources, including a unique early rural roadway with stone retaining walls and stone paving. This historic area is further enhanced by stone fence lines, cedar hedge rows, and a pair of large cedar trees marking a lane entrance off the road.

This predominantly forested tract contains two distinctive "glade-like" openings. Gray's Bluff, overlooking the reservoir, provides a major geological feature. It contains numerous rare plants, a rare animal, and a cave. Liatris cylindracea, cylindric blazing star, is endangered in Tennessee and occurs in the openings; Onosmodium hispidissimum, hairy false gromwell, is associated with the edges of the openings; and Polymnia laevigata, leafcup, occurs sporadically in the forest and is under review for Federal listing by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973. The green salamander (Aneides aeneus), a candidate species for Federal listing, occurs on the limestone bluffs. Little Cedar Mountain Cave receives regular use by bats. Management needs are immediate.

The vertical bluff at the southernmost tip of Little Cedar Mountain provides significant visual resources. Only minor development, such as hiking trails, which are compatible with the visual and ecological character of this tract, will be permitted.

Excellent habitat diversity for a variety of upland wildlife species occurs on this tract. Hiking, wildlife observation, nature study, and photography are compatible public uses of the tract and will complement the more intensive recreational development on the adjacent Tract No. 3.

TRACT NO. 6 - (32.5 ac.)

- PLANNED USE: 4
  Informal Recreation
  Visual Protection
  Wildlife Management

- RELEVANT DATA:

This tract consists of five islands adjacent to the northeastern portion of Little Cedar Mountain in the Rankin Cove area. Interstate 24 crosses the two larger islands. The Tennessee Department of Transportation has constructed an eastbound visitor's center and a westbound rest area on the largest island. As in the case of all reservoir islands, the ones which comprise this tract provide excellent recreational resources for informal public use including fishing, boating, camping, hiking, swimming, wildlife observation, and photography.

In addition to providing open space for informal recreation activities, islands contribute significantly to a reservoir's aesthetics. The visual quality of the three undeveloped islands, not traversed by Interstate 24, are rated excellent, with the Interstate 24 islands being rated good. All five islands will be protected from further development in order to maintain the aesthetics of this area of the reservoir.

These islands also provide good wetlands wildlife habitat. They are surrounded by extensive aquatic bed wetlands with American pondweed and Eurasian watermilfoil the dominant plant species. This area is used extensively by wood ducks, migratory ducks, coots, and grebes.

TRACT NO. 7 - (12.9 ac.)

- PLANNED USE: Public Recreation 6

- RELEVANT DATA:

This tract, located on the left bank below Nickajack Dam, adjacent to the Nickajack Port, is a portion of the Nickajack Dam Reservation. It contains an existing TVA day-use recreation area and paved boat ramp. Additional facilities include a 5-unit picnic area, fishing berm, and toilet building. The pink mucket pearly mussel (Lampsilis orbiculata), a federally listed endangered species, occurs in the reservoir tailwaters adjacent to this tract.

TRACT NO. 8 - (154.6 ac.)

- PLANNED USE: Forest Management
  Informal Recreation
  Visual Management
  Wildlife Management 4

- RELEVANT DATA:

This tract is located behind Tract No. 7 and is adjacent to State Highway 156 and the Nickajack Port. It has good forest management capability containing high-quality, large sawtimber, upland hardwood, small sawtimber, and mixed pine. Two 70-year-old forest stands are approaching maturity and have a net present value exceeding $900 per acre. Good access is provided from an existing logging road network.

The accessibility of this tract, by way of the logging road network, by the public road providing access to the TVA recreation area located on Tract No. 7, and by boat along the tract's shoreline, establish its excellent capability for informal recreational use.

Because of the tract's high visibility from the reservoir and the highway and its close visual association with Nickajack Dam, it was rated as having good capability for visual management.

The upland hardwood forests provide good escape and resting cover and hard mast food production for a variety of upland wildlife species. Aquatic bed wetlands occur along the shoreline. Although its location adjacent to areas of intensive human use precludes extensive wildlife habitat improvement for public hunting use, wildlife observation, photography, and hiking are suitable informal recreation uses.

TRACT NO. 9 - (169.6 ac.)

- PLANNED USE:
  Forest Management
  Informal Recreation
  Visual Management
  Wildlife Management

- RELEVANT DATA:

This tract is located adjacent to the southern side of State Highway 156 and the western side of State Highway 156A. It surrounds the Hogjaw Creek embayment, and its southeastern boundary extends to the Tennessee/Alabama line.

The forest resource capability of this tract is fair. It contains bottomland hardwood, upland hardwood, and large sawtimber stands. The forest net present value ranges from $332 to $500 per acre.

Visual buffers will be maintained along the roadways and reservoir shoreline to protect the tract's good visual quality. The tract has excellent capability for informal recreation and currently supports a moderate level of informal public use. It has good capability for wildlife management, providing habitat for a variety of forest dependent upland wildlife species. Aquatic bed wetlands occur along the shoreline.

TRACT NO. 10 - (254.5 ac.)

- PLANNED USE:
  Cultural Resource Protection
  Habitat Protection Area
  Public Recreation
  Small Wild Area
  Visual Management

- RELEVANT DATA:

This tract is bordered by State Highway 156A, the Tennessee/Alabama state line, and the Cole City Creek embayment. It contains significant cultural resources which may affect further public recreation development. Further development may require additional archaeological testing or mitigation of adverse impact to archaeological sites. The costs of required testing or mitigation may be the responsibility of the developer.

Nickajack Cave, which supports one of the largest summer populations of the federally endangered gray bat (Myotis grisescens) found in the Tennessee Valley, is located on this tract. During recent censuses, approximately 125,000 gray bats were counted at Nickajack Cave. The cave is also used by small numbers of wintering Indiana bats (Myotis sodalis), also federally listed as endangered, and eastern small-footed bats (Myotis leibii), State listed as in need of management and a candidate species for Federal listing. Other species in or near the

cave include the Tennessee cave salamander (Gyrinophilus palleucus), threatened in Tennessee and a candidate species for Federal listing; the green salamander (Aneides aeneus), a candidate for Federal listing; and Caecidotea nickajackensis, a troglodytic isopod (small crustacean) and candidate species for Federal listing. Past efforts to protect the biological resources of Nickajack Cave have included the construction of a fence across the cave opening to restrict human access, and designation of the area as a TVA Habitat Protection Area and as a TVA/TWRA Wildlife Observation Area.

Maple View Day Use Area, a TVA-developed and managed public day-use recreation area, is also located on this tract. Facilities include 31 picnic units, a paved boat ramp, toilet building, swimming beach, and a 0.3-mile trail to Nickajack Cave. TVA employs a resident manager who lives on site to manage and maintain the area. Additional public recreation development potential is long range.

The mountainous portion of this tract above Nickajack Cave and behind Maple View Day Use Area offers potential for development of hiking trails and overlooks of the reservoir, nature study, and quiet solitude in a wooded setting. Visitors can combine a picnic and swim with a hike and evening experience of watching thousands of endangered gray bats emerge from Nickajack Cave to feed on insects over the reservoir during the summer months. The mountain is wooded and has two powerline maintenance roads that serve as informal trails. A loop trail has been proposed that would lead to a boulder in the woods that marks the corner of Tennessee, Georgia, and Alabama. Designation of this tract for a Small Wild Area would complement the recreation facilities at Maple View Public Use Area and Nickajack Cave Habitat Protection/Wildlife Observation Area.

This tract will be managed to ensure that any future development will not adversely impact the existing visual quality. Aquatic bed wetlands occur along the shoreline, which is a herbicide treatment area.

TRACT NO. 11 - (30.3 ac.)

- PLANNED USE:
  - Forest Management
  - Informal Recreation
  - Visual Management
  - Wildlife Management

4

- RELEVANT DATA:

Located at the head of the Cole City Creek embayment, this tract's forest resources consist of both large and small sawtimber and mixed (Shortleaf and Virginia) pine stands. The forest net present value ranges from $240 to $440 per acre. Because of its location adjacent to the reservoir, buffer strips will be retained to protect the tract's visual quality. It provides good habitat for a variety of forest dependent upland wildlife species and receives moderate informal recreation use. Aquatic bed wetlands occur along the shoreline.

TRACT NO. 12 - (10.4 ac.)

- PLANNED USE: Visual Management
  Water Access

- RELEVANT DATA:

This tract is bordered by the Cole City Creek embayment and a county road which intersects State Highway 156. It contains TVA's Cole City Creek Water Access site and is needed for future expansion of the boat ramp parking lot. Additional development is mid-range (3 to 7 years) and will take into account the visual resources of the tract and the Cole City Creek embayment. Aquatic bed wetlands occur along the shoreline, which is a herbicide treatment area.

TRACT NO. 13 - (73.0 ac.)

- PLANNED USE: Cultural Resource Protection
  Visual Management
  Wildlife Management

- RELEVANT DATA:

This tract is located on the opposite, eastern side of the county road from Tract No. 12. The Macedonia Baptist Church, a small, frame country church dating from the turn of the century, is surrounded by a portion of this tract. The adjacent cemetery dates back to the 1890s. This steep narrow tract contains mature hardwoods and provides good habitat for forest-dependent upland wildlife species. Visually, the tract will be managed to protect the historical integrity of the Macedonia Church and cemetery. Aquatic bed and emergent wetlands occur along the shoreline of a small basin adjacent to the tract.

TRACT NO. 14 - (28.9 ac.)

- PLANNED USE: Right-of-Way Protection

- RELEVANT DATA:

This tract contains several parcels located along the railroad and highway embankments downstream of the U.S. Highway 41 bridge. These lands will be maintained for the protection of the rail and road right-of-way. Aquatic bed wetlands occur adjacent to portions of these lands.

TRACT NO. 15 - (40.6 ac.)

- PLANNED USE:
  Agriculture
  Cultural Resource Protection
  Visual Management
  Wildlife Management

- RELEVANT DATA:

This tract lies adjacent to the Seaboard Railroad and contains 40 percent prime farmland. Portions of the tract are currently licensed for hay and pasture use. Adjacent to this tract is an early farm complex containing two log houses, one of which is identified as "Old Chimney House Built 1789." In addition, there is a log crib with a cantilevered front gable overhang, a small frame crib, and a large frame barn. All of these features appear to be 19th century and are in good condition. This tract will remain undeveloped to protect the agricultural setting and view of the historic complex from the reservoir. Continued agricultural licensing of this tract will include provisions to improve existing wildlife habitat.

TRACT NO. 16 - (102.8 ac.)

- PLANNED USE:
  Habitat Protection Area
  Visual Management
  Wildlife Management

- RELEVANT DATA:

This tract is located between the Seaboard Railroad and State Highway 156. It contains a forested steep slope and bluff which support a mature stand of Cotinus obovatus, American smoketree, listed as endangered in Tennessee. The population contains seedlings, saplings, young trees, and mature trees and provides an area in which the biology of the species could be studied. In the TVA region, this species is limited to two counties in southern Tennessee and three counties in adjacent northern Alabama. Management needs are immediate.

The mature mixed hardwoods on this tract provide good reproductive habitat and good food production capability in the form of hard mast for such upland wildlife species as deer and squirrel. In addition, they provide good habitat for woodpeckers and many songbird species.

TRACT NO. 17 - (17.1 ac.)

- PLANNED USE: Barge Terminal Site
  Industrial Site 5

- RELEVANT DATA:

This tract is located on the north side of the Seaboard Railroad in the vicinity of the Ladds Community. It contains 50 percent prime farmland, and portions are currently licensed for hay and pasture agricultural purposes. Continued licensing will be considered.

This tract is one of two commercial barge terminal/industrial sites that were prepared prior to impoundment of Nickajack Reservoir. The tract was graded and riprapped so that it would be available for future development. It has been shown to industries several times in the past few years and was the first choice for a facility proposed by Quaker Oil in the late 1970s but the required adjoining private land was not available for purchase. Rail and highway access can be provided to the tract. Aquatic bed wetlands occur along the shoreline.

TRACT NO. 18 - (9.8 ac.)

- PLANNED USE: Commercial Recreation
  Public Recreation
  Visual Management 6

- RELEVANT DATA:

This tract is located between Tract No. 17 and the Interstate 24/State Highway 156 interchange and contains TVA's Running Water Campground. Facilities include 47 campsites, swimming beach, toilet building, and boat ramp. TVA's Recreation Resources Program has requested proposals for commercial operation of the campground. Additional development potential is long range (5 to 10 years). Any future development will take into consideration the visual resources of this tract. Aquatic bed wetlands occur along the shoreline, which is a herbicide treatment area.

TRACT NO. 19 - (48.6 ac.)

- PLANNED USE: Visual Management
  Wildlife Management 4

- RELEVANT DATA:

This tract consists of several non-contiguous and generally narrow parcels located along Interstate 24, U.S. Highway 41, and State Highway 134. These parcels enhance the visual quality of the reservoir as seen from the adjacent roadways. Aquatic bed wetlands occur along the majority of the shoreline fronting these parcels and are used extensively by migratory ducks, coots, and grebes.

The small parcel at the mouth of Running Water Creek is predominantly an emergent wetland with cattail, woolgrass, and rushes as the principal plant species. This wetland area has extended into the reservoir, apparently from silt accretion from the creek. The silt buildup creates shallow mud bar-type areas that are subsequently invaded by emergent plant species. Such areas are limited on Nickajack Reservoir and are used by wading birds such as great blue and green-backed herons. In addition, several great egrets (listed as in need of management in Tennessee) were observed feeding in the shallow areas adjacent to this tract during the late summer/early fall of 1987. A small number of resident Canada geese have also been observed using the area.

TRACT NO. 20 - (4.1 ac.)

- PLANNED USE: Commercial Recreation 6

- RELEVANT DATA:

This tract is located adjacent to the U.S. Highway 41 bridge approach and the Haletown community. It is currently under license for commercial recreation purposes to the adjacent owner/operator of Anchor Inn bait and tackle store. The licensee has developed 12 full-service campsites and sells gasoline, food, and supplies from the store located on his adjoining private property. The licensed tract is managed for boat access and has no permanent improvements. Although the tract is small, its location immediately adjacent to U.S. Highway 41 and the existing commercial establishment presents an opportunity to provide boat launching services for reservoir users. Future development potential is short range (1 to 5 years). Industrial road access from U.S. Highway 41 to the adjacent Tract No. 21, designated for Barge Terminal Site and Industrial Site, will be maintained across this tract. Aquatic bed wetlands occur along the shoreline, which is a herbicide treatment area.

TRACT NO. 21 - (19.9 ac.)

- PLANNED USE: Barge Terminal Site
  Industrial Site 5

- RELEVANT DATA:

This tract is upstream of and adjacent to Tract No. 20 and the residential community of Haletown. A small portion of the tract is currently licensed for a vegetable garden by an adjacent resident.

This is the second of two commercial barge terminal/industrial sites that were prepared prior to the impoundment of Nickajack Reservoir. The site was graded and riprapped so that it would be available for future development. Grading was done prior to impoundment to provide 11 feet of water depth at low pool along the site. A portion of the tract has been used for a barge transfer and repair operation, relocated from a site at the Marion County bridge, which was inundated by the impoundment of Nickajack Reservoir.

Road access from U.S. Highway 41 to this tract will be maintained across Tract No. 20. Industrial and/or barge terminal development of this tract will include appropriate buffers to minimize impacts on adjacent residential development. Aquatic bed wetlands occur along the shoreline which is a herbicide treatment area.

TRACT NO. 22 - (3.0 ac.)

- PLANNED USE: Public Recreation 6

- RELEVANT DATA:

This small tract is located between Tract No. 21 and the public road which provides access to Hales Bar Marina from U.S Highway 41. It has been licensed to Marion County for the location of a fire station and for public recreation purposes. Located in the Guild/Haletown community, it is used for informal athletic activities and special events. A backstop and mowed field give the appearance of a playfield. There are no other formal outdoor recreation facilities in the community. Further development potential is long range (5 to 10 years).

TRACT NO. 23 - (11.9 ac.)

- PLANNED USE: Water Access 4

- RELEVANT DATA:

This tract is located on the left bank downstream of Hales Bar Resort and Marina. It contains a TVA-developed and maintained boat ramp and parking lot which is easily accessible from U.S. Highway 41 and receives consistent use from the Guild/Haletown community. Additional development potential is long range (5 to 10 years). Aquatic bed wetlands occur along the shoreline, which is a herbicide treatment area.

TRACT NO. 24 - (10.8 ac.)

- PLANNED USE: Informal Recreation 4
  Visual Management

- RELEVANT DATA:

This narrow strip of shoreline is partially adjacent to, and visible across, a subimpoundment of Rankin Cove from U.S. Highway 41. It is adjacent to private residential development; however, the highway fill blocks access from this tract to the main portion of the reservoir. It receives informal recreational use by the adjacent residents. An unapproved private water use facility (dock) exists on the tract and will be dealt with as an ehcroachment. Maintenance of this tract in an undeveloped state will enhance the visual quality of this portion of the reservoir, especially as viewed from U. S. Highway 41. Aquatic bed wetlands occur along the shoreline, which is a herbicide treatment area.

TRACT NO. 25 - (40.5 ac.)

- PLANNED USE: Right-of-Way Protection 4
  Visual Management

- RELEVANT DATA:

This narrow strip of TVA land is located along the northern side of U. S. Highway 41 and the southern edge of Cedar Mountain. Marion County Park is located across the highway. 26a tract provides protection for the highway right-of-way and it also includes the southeastern most tip of Cedar Mountain, located on the southern side of the highway. It tract will be managed to protect the visual integrity of Cedar Mountain as viewed from the highway and the reservoir. Aquatic bed wetlands occur along the shoreline, which is a herbicide treatment area.

TRACT NO. 26 - (103.5 ac.)

- PLANNED USE: Habitat Protection Area
  Visual Management
  Wildlife Management

4

- RELEVANT DATA:

This tract is located on the eastern side of Cedar Mountain adjacent to the main channel of the reservoir. Three species of rare plants occur along the limestone bluffs and within the associated forest. Polymnia laevigata, leafcup, is an herbaceous member of the sunflower family that is under review for Federal listing. Cotinus obovatus, American smoketree, which occurs along the bluff, is listed as endangered in Tennessee and is represented by a healthy, reproducing population on this tract. Onosmodium hispidissimum, hairy false gromwell, is of special concern in Tennessee and is reported from only three other sites in the State. The presence of these three rare plants, as well as the size and undisturbed nature of this tract, makes it suitable for designation as a Habitat Protection Area.

The mature upland hardwood stands provide good habitat for a variety of forest-dependent wildlife species such as deer, squirrel, raccoon, woodpeckers, and various songbirds. The steep shoreline (bluff) portion of the tract provides the security and remoteness required by wintering bald eagles and migrating osprey for resting areas. Aquatic bed wetlands occur along the northern portion of the shoreline.

TRACT NO. 27 - (65.1 ac.)

- PLANNED USE: Forest Management
  Wildlife Management

4

- RELEVANT DATA:

This tract is adjacent to Tract No. 26. The forest resources on this tract include large sawtimber and upland and cove hardwoods that are approaching maturity. The stocking and species present (white oak, northern red oak, sugar maple, and ash) are indicative of a climax forest. While the topography is steep to moderately steep, with rocky, low productivity soils, tree growth appears good. This tract contains one of the most valuable timber stands on the reservoir--veneer quality hardwoods--with a net present value in excess of $670 per acre. Wildlife habitat improvement benefits will be achieved through proper timber management.

TRACT NO. 28 - (25.6 ac.)

- PLANNED USE: Right-of-Way Protection 4
- RELEVANT DATA:

This narrow, linear tract provides the right-of-way for the old Hales Bar Lock and Dam Road and will be maintained to protect the visual and historical integrity of the roadway and an adjacent historic farmstead. Bette's farmstead is believed to date from the 1840s. The original log house has been covered with siding, but a log smokehouse and small barn remain.

TRACT NO. 29 - (177.8 ac.)

- PLANNED USE: Informal Recreation
  Visual Protection 4
  Wildlife Management
- RELEVANT DATA:

With the exception of a small tract (Tract No. 30) located at river mile 440, which is designated for Water Access, this tract includes all remaining TVA reservoir land between TRM 431 and TRM 441.5, including all TVA fee-owned islands. This portion of the reservoir is a part of the Tennessee River Gorge. An existing Memorandum of Understanding between TVA and The Nature Conservancy, which will be maintained, provides for the protection of the natural resources located on TVA land within the gorge. These lands will continue to be managed by TVA for informal recreation, visual management, and wildlife habitat improvement activities; however, no development will be allowed. Significant cultural resources exist on these lands. Aquatic bed, emergent, scrub/shrub, and forested wetlands occur along the shoreline and portions of the shoreline are herbicide treatment areas.

TRACT NO. 30 - (2.3 ac.)

- PLANNED USE: Water Access 4
- RELEVANT DATA:

This small tract located at TRM 440, contains a TVA developed and maintained boat ramp and parking lot. Its location immediately adjacent to U. S. Highway 41 and directly across the highway from Sullivan's Store makes it one of the most popular water access sites on the reservoir. Additional development potential is long range (5 to 10 years).

TRACT NO. 31 - (20.4 ac.)

- PLANNED USE: Habitat Protection Area
  Visual Protection
  Wildlife Management

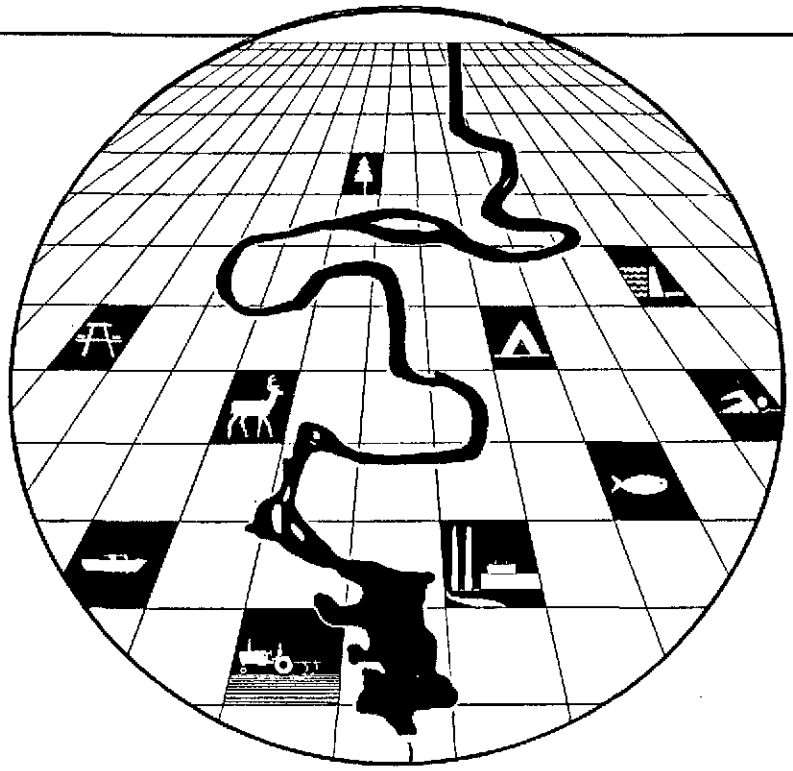
4

- RELEVANT DATA:

The natural resource characteristics of this tract and Tract No. 29 are similar. However, in addition, approximately 35 individuals of Scutellaria montana, large-flowered scullcap, occur on this tract. This is the only place on Nickajack Reservoir where this federally listed mint occurs on TVA land. About 40 individuals occur immediately across U.S. Highway 41 on private land. The tract is covered with a relatively undisturbed forest of mixed hardwoods and scattered pines. There is a minor invasion of exotic weeds along the roadside. The protectability of the scullcap population, its low level of disturbance, and the high endangered status of the species make this site's suitability as a habitat protection area excellent. Priority is high and management needs are immediate.

NICKAJACK RESERVOIR PLAN

Implementation



IMPLEMENTATION

This plan sets forth a strategy for the management of reservoir land and identifies suitable uses for each tract of land. To move from the plan to actual integrated resource management will require continuous coordination of TVA's property administration functions and resource management activities.

PROPERTY ADMINISTRATION

In relation to TVA property administration, the plan provides guidance for responding to requests for the use of TVA land. All inquiries about or requests for the use of TVA land on Nickajack Reservoir should be made to TVA's Central Land Resources District office (Manager, Property Management, Post Office Box 606, 1101 Congress Parkway, Athens, Tennessee 37303; (615) 745-1783 or (615) 632-2088). Requests will generally fall into one of four categories: (1) a proposed land use that agrees with the tract designation in the plan; (2) a proposed land use that does not agree with the plan tract designation but is otherwise consistent with TVA policy or legal authority; (3) public service uses not specifically considered during the development of the plan; or (4) a proposed land use that does not agree with the plan designation and is also precluded by TVA policy or legal authority.

Proposals that fall into the fourth category would normally be rejected at the district office level. For each of the other three categories of requests, the applicant will be required to demonstrate the public benefits of the request, the need for TVA reservoir land, and the capability of the tract to support the requested use. The applicant must also provide information about the proposed investment schedule, capital improvements, and other information typically required of any applicant for use of TVA land.

Category 1

When a proposal is in agreement with the tract designation, the request will be reviewed in accordance with the National Environmental Policy Act and other legal authorities. The reservoir data base will allow such reviews to proceed more quickly and at a lower cost.

Category 2

If a proposed land use is consistent with TVA policies but is not congruent with the tract designation, the applicant will be directed to consider other tracts identified for the proposed use. If the applicant finds none of the alternatives to be satisfactory, he or she may be given the opportunity to provide justification that a modification to the plan is warranted and in the best public interest.

For such requests that are not congruent with the plan tract designation, TVA staff will use the reservoir data base and information provided by the applicant to determine if the requested site is physically capable of supporting the proposed use. If the capability evaluation reveals

that the tract does not have the physical characteristics necessary to support the proposed use, the request will be denied. If the tract is found to be capable of supporting the proposed use, an interdisciplinary TVA team will conduct a suitability review that will include, in addition to public input, an assessment of potential impacts on the environment and adjacent land uses, surrounding plan tract designations, land management goals, reservoir plan objectives, and socioeconomic conditions. Public input will be a key component of this suitability analysis. If the request is found to be suitable, it will be coordinated within TVA following established land use review procedures. Any requests involving a departure from the planned use(s) will require the approval of the TVA Board of Directors.

Category 3

Public service uses (highways, utility corridors, etc.) can seldom be identified during the planning process and must therefore be evaluated once a specific proposal is presented to TVA. Such requests will be considered on any of the plan tracts and will be evaluated in the same manner as Category 2 requests.

RESOURCE MANAGEMENT

In terms of resource management, the plan establishes general strategies for managing the tracts. Specific on-the-ground management activities will be more clearly defined by TVA program staffs responsible for implementing the designated use(s). The programs, in conjunction with district office staff, will plan for the management of each tract by developing two levels of workplans:

1. The programs will develop a 3-year operational plan that describes specific resource management activities, identifies budget and personnel requirements to carry out the management activities, and develops a priority ranking of the activities based on available budget and personnel.

2. The program and district staffs will jointly develop a detailed 1-year workplan for the upcoming fiscal year. The workplan establishes a schedule and quality control specifications for the activities to be completed in the fiscal year. It also identifies project or activity leaders responsible for ensuring that the management activities are completed properly, on time, and within budget.

The workplans will (1) reflect the goals and objectives of the plan and (2) incorporate all specific development and management provisions noted in the tract descriptions and elsewhere in the plan. Important resource data and specific development constraints are noted in many of the tract descriptions. The definitions of planned uses also set limits on what can and cannot be done on plan tracts.

Implementation plans developed for those tracts identified for more than one use will reflect consideration and integration of all the designated uses. All the uses on multiple-use tracts are of equal importance, and each involved program shares the responsibility for reaching agreement on appropriate management activities.

Following development of the workplans and coordination with appropriate staffs, it will be the joint responsibility of the district Property Management staff and the appropriate program staffs to see that management activities are implemented on schedule and within allocated budgets.

TVA's Property Management and Administration Department will monitor regional and local environmental, social, and economic changes that may indicate a need for updating or revising portions of the reservoir management plan. The plan is intended to be used for 8 to 10 years, at the end of which TVA will initiate a review of land uses on the entire reservoir. During this review, input from the public and TVA staff will be used to identify necessary revisions to the reservoir plan and to make policy recommendations. The reservoir resource data base will be updated on a regular basis to ensure that information is kept current and accurate.